BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL VETERINARY BULLETIN.

VOL. 14.] August 31, 1926. [No. 3.

DISEASES DUE TO PROTOZOAN PARASITES.

TRIFFITT (Marjorie J.). **Observations on Amoebae found in the Faeces of certain African Ungulates.**—*Protozoology.* 1926. Jan. No. 2. pp. 27–30. With 1 plate.

The author describes amoebae found in the faeces of *Hippotragus niger* (sable antelope), *Cobus ellipsiprymnus* (common waterbuck), and an eland (*Oreas canna*). The animals were all in the Zoological Gardens, London. It is not stated whether they were freshly imported or not.

The organisms are figured and described. It is thought that two species are represented.

Both vegetative and encysted forms were present in the faeces of the antelope and the waterbuck, but only encysted forms were obtained from the eland. In the latter case all the specimens found were uninuclear, but otherwise the organism closely resembled *E. histolytica.*

IZQUIERDO (A.). **Modificaciones del aspecto físico de la sangre en la durina y sus causas.** [Changes in the Physical Properties of Blood from Animals affected with Dourine.]—*Rev. Hyg. y Sanidad Pecuarias.* 1926. Mar. Vol. 16. No. 3. pp. 148–150.

The author finds that in 20 per cent. of animals affected with dourine the blood behaves in a variable manner when withdrawn. Either the corpuscles sediment very rapidly, or form a uniform red clot. There is also a " rarefaction " of the serum.

He believes that the sedimentation is due to the presence of an auto-agglutinin. He does not appear to have examined the blood of controls not affected with dourine.

IZQUIERDO (Amado). **Contribución al estudio biológico del tripanosoma equiperdum.** [The Biology of *T. equiperdum.*]—*Rev. Hig. y Sanidad Pecuarias.* 1925. Nov. Vol. 15. No. 11. pp. 739–743. With 10 text figs.

The trypanosome of dourine may be met with in the male urethra or in the vagina of the female fairly frequently, though not in all

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cases. It is rarely encountered in the blood in spite of the fact that it would have to pass through the circulation to produce the cutaneous and other lesions. Noting the auto-agglutination of erythrocytes in this disease the author diluted the blood one hundred-fold with normal saline in order to see whether he could not discover the living protozoon in its adult or intermediate stages. He noted at certain parts of the preparation sudden shaking movements among the corpuscles which were found to be due to the rapid passage of crithidial forms. These were oval in shape, 8–12 microns long by 5–8 broad, narrow at one end which is denominated the anterior, and with a flagellum, 14–16 microns in length, at the other. They were watched for 48 hours and were still living when kept at the laboratory temperature, 20° C. They were seen to multiply by fission and at the end of 30 hours the original number had been approximately doubled. Several were seen to engulf red blood-corpuscles.

The author believes that the positive results of inoculation experiments with the blood, although examination of the blood itself shows no trypanosomes, are due to the parasite being present in the crithidial forms only.*

QUIROGA (Santiago S.). **Sobre el cultivo de los tripanosomas. Algunos ensayos con el** *Tr. equinum.* [The Cultivation of Trypanosomes. Attempts with *T. equinum.*]—*Revista Zootécnica.* Buenos Aires. 1925. Dec. 15. Vol. 12. No. 147. pp. 367–374. [24 refs.]

The author briefly reviews the previous accounts of cultivation-experiments of trypanosomes and then records the results of his own attempts with various media, in particular N.N.N., Miyajima's blood-broth, aerobically and anaerobically, with and without fragments of organs (kidney, testis, brain of rabbits), and Ponselli's medium. The tubes after inoculation were kept between 20° and 25° C., and examined at intervals. Even at the end of a fortnight some living forms were seen, but from their appearance they were regarded as surviving members of the material originally introduced. In no instance was the author satisfied that any actual growth or multiplication took place.*

HOWARD (G. G.). **A Note on Treatment of Equine Trypanosomiasis (Surra) "in the Field" in India.**— *Vet. Jl.* 1926. Feb. Vol. 82. No. 2. pp. 105–110.

Ten clinical cases of Surra were placed under treatment. Trypanosomes were present in the blood at intervals ranging from three to ten days.

Treatment was begun by giving each animal 7 cc. of normal solution of tartar emetic (approximately 3 per cent.) intravenously. This dose was responsible for transitory symptoms of intoxication in some of the animals. It had the effect of clearing the circulation, but as a rule parasites reappeared on the third day.

The animals were then divided into two batches, A and B.

Batch A received on three consecutive days 1,000 cc. of 1 per cent. arsenious acid solution, 100 cc. of 4 per cent. solution of atoxyl

* Summarized by Dr. H. Harold Scott.

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subcutaneously and 1·5 g. of crude arsenic in bolus. After three days interval the three doses were repeated. This treatment lasted from October 24th 1924 till November 20th.

Batch B received only atoxyl and crude arsenic alternately with one day interval between each. The treatment was continued for the same length of time.

Of the five in Batch A, two relapsed and were destroyed, one was destroyed before treatment was completed owing to an accident, and two apparently recovered (February 1925).

Batch B. One relapsed but was kept for subsequent treatment with "Bayer 205," one relapsed and was destroyed. One showed marked toxic symptoms and, after an interval of two weeks, died. The remaining two apparently recovered, but one of these showed inco-ordination.

The four surviving animals which showed no trypanosomes in their blood were given doses of "Bayer 205" ranging from 1 gramme to 3 grammes "without visible effect."

VAN SACEGHEM. **Traitement des infections dues à** *Trypanosoma brucei*. [The Treatment of *brucei* Infections.]—*Bull. Méd. Katanga*. 1925. Dec. Vol. 2. No. 6. pp. 254–255.

A dog infected experimentally with *T. brucei* in December 1924 was given a single intravenous injection of 50 centigrammes of "Bayer 205." The following day the blood was free of trypanosomes, and has remained so up to the time of writing (November 1925).

A mule, naturally infected with *T. brucei*, was given 3 grammes of the drug intraveneously. Trypanosomes disappeared, but reappeared after a lapse of a month. A further injection of 4 grammes was then given and the circulation remained clear for two months. An injection of four grammes again cleared the circulation, but the animal died about ten days later. The exact cause of death was not established.

COLLIER (W. A.). **Sobre la acción del "Bayer 205" en combinación con el antimonio.** [On the Combined Action of "Bayer 205" and Antimony.]—*Revista de Med. Vet.* Buenos Aires. 1925–26. Oct.–Mar. Vol. 8. Nos. 4–6. pp. 119–127.

This contribution is an attempt to solve the problem why a mixture of "Bayer 205" and tartar emetic proves so much more effective in treating cattle suffering from trypanosome infection than either drug separately. The whole subject is a complicated problem in immunology. It has been shown that "Bayer 205" in certain strengths lessens or actually abolishes the coagulation of blood-serum by heat, and this may be due to an albuminoid compound formed between the drug and the serum. A series of tests was set up the results of which demonstrated that 1 per cent. of "Bayer 205" had this effect, whereas 0·5 per cent. had none, and apparently a compound is formed between it and the globulins. A similar series showed that the antimony salt has no such effect; on the contrary, it annuls that of "Bayer 205." It is, therefore, inferred that the globulin-Bayer compound is changed

by the addition of antimony. The first of these experiments may help in explaining the action of those drugs which have an effect upon parasitic organisms *in vivo*, but appear to be inert *in vitro*.*

HORNBY (H. E.) & BURNS (William A.). **An Attempt, with the Aid of Drug Treatment, to keep Cattle in a Tsetse-fly Belt.**—*Jl. Comp. Path. & Therap.* 1926. Mar. Vol. 39. No. 1. pp. 30–38.

The work here recorded is being done in connexion with SWYNNERTON's experiment of cleaning large areas of bush. The attempt is being made to protect the oxen used for ploughing up the cleared and stumped areas in the neighbourhood of bush.

Two lines of treatment are being followed. These are BERG's system of injecting a mixture of 2·5 g. " Bayer 205 " and 1 g. of tartar emetic at intervals of a fortnight (see this *Bulletin*, Vol. 14, No. 1, pp. 5–6), and the injection of tartar emetic alone.

A batch of 30 bulls was used. Ten of these received tartar emetic alone (25 cc. of 4 per cent.), 10 received 2·5 g. of " Bayer 205 " and 1 g. of tartar emetic in 25 cc. of water, and the remaining 10 were controls.

Of the controls 6 died within 3 months, and none survived 8 months. Of the 10 receiving tartar emetic once a fortnight (approximately) 2 died within seven months, and the remaining 8 were in marketable condition, although infected at that time.

Of the 10 treated with the two drugs, 3 were dead within seven months, 1 was very ill, but the surviving 6, although infected, were in marketable condition.

The parasites responsible for the infections were *T. congolense* and *T. vivax*, and the fly was *G. swynnertoni*.

MIESSNER (H.) & BERGE (R.). **Die trypanozide Kraft des Arsenobenzol-Präparates "Albert 102."** [The Trypanocidal Properties of " Albert 102."]—*Deut. Tierärzt. Woch.* 1926. Apr. 17. Vol. 34 No. 16. pp. 285–289.

" Albert 102 " is a chrome yellow powder which is readily soluble in water, particularly with slight warming. It is also soluble in warm glycerin. It is slightly alkaline in reaction.

It may be used for subcutaneous or intravenous injection, or, in glycerin, as an unguent.

A small number of tests were carried out with a view to ascertainng its bactericidal qualities, but it was found to be practically ineffective.

In vitro tests with trypanosomes showed that the addition of 1 drop of a 1 per cent. solution to 2 cc. of a suspension of *T. equiperdum* obtained from a mouse rendered the trypanosomes motionless in a few minutes.

In animal tests mice and guineapigs infected with *T. brucei* and *T. equiperdum* were used.

It was found that a 50 per cent. solution in glycerin rubbed into the abdominal wall prior to inoculation protected mice from infection when the interval between the operations was 3 days, but not 6 days.

When the drug (doses not stated) was injected subcutaneously at the same time that intraperitoneal inoculation was carried out, the mice failed to become infected.

Summarized by Dr. H. Harold Scott.

VAN SACEGHEM (René). **L'action du tryparsamide dans les trypanosomiases animales.** [Tryparsamide in the Treatment of Animal Trypanosomiasis.]—*Ann. Soc. Belge Méd. Trop.* 1926. Jan. Vol. 5. No. 2. pp. 121–123.

The author gives details of experiments the results of which confirm his views that Tryparsamide has no therapeutic value for the treatment of animals infected with *T. congolense* and *T. cazalboui* var. *vivax*. Doses of 0·066 g. per kilo live weight are toxic, but do not cause disappearance of trypanosomes from the circulation.

VAN DEN BRANDEN (F.). **L'action du tryparsamide chez les trypanosés chroniques.** [Tryparsamide in Chronic Trypanosomiasis.]—*Bull. Soc. Path. Exot.* 1926. Jan. Vol. 19. No. 1. pp. 8–11.

The author reports cases which he considers support his view that failures in the treatment of chronic trypanosomiasis with tryparsamide are due either to the simultaneous existence of syphilis or to a previous treatment with arsenic which has rendered the parasites fast to the drug.

LAIGRET (J.). **Traitement de la trypanosomiase humaine par la tryparsamide.** [The Treatment of Human Trypanosomiasis by Tryparsamide.]—*Ann. Inst. Pasteur.* 1926. Mar. Vol. 40. No. 3. pp. 173–193.

The author finds tryparsamide at least as good as atoxyl in the first stage, and far superior to it in the second stage. The remarkable apparent recoveries obtained in advanced cases have exercised a very favourable moral effect upon the natives.

The drug is equally effective in pian and syphilis.

VAN DEN BRANDEN (F.). **Le stibosan "préparation Heyden No. 471" dans le traitement de la trypanosomiase humaine.** [Stibosan "Heyden No. 471" in the Treatment of Human Trypanosomiasis.]—*Bull. Soc. Path. Exot.* 1926. Mar. Vol. 19. No. 3. pp. 193–196.

The author gives details of five cases treated.

He concludes that stibosan has a trypanocidal action, but that this action is slower than that of tartar emetic, although more rapid than that of stibenyl.

It is not of great value for the treatment of chronic cases.

BARBACCI (P.). **Sur un cas de *Leishmania infantum* observé à Sienne (Italie).** [A Case of *Leishmania infantum* at Sienna.]—*Bull. Soc. Path. Exot.* 1926. Jan. Vol. 19. No. 1. pp. 11–14. With 1 text fig.

The case was detected in a four-year-old child who had, at the age of two, lived at Monaco for some weeks. The first symptoms appeared about seven weeks after arrival there.

On return to Sienna a definite diagnosis was established by spleen puncture. Attempts to cultivate the parasite from the spleen failed,

and blood examination was negative. Intravenous injection of antimony tartrate was without avail. Death took place from tuberculous broncho-pneumonia.

It is not certain by any means that the disease was contracted at Sienna, more particularly as there is in the clinique there another case of the disease in a child. This child had also spent some months in Monaco. In this second case cultures from the spleen have been positive.

TRIFFITT (Marjorie J.). **Some Sporozoan Parasites found in the Intestinal Wall of Bennett's Wallaby** (*Macropus bennetti*).—*Protozoology*. 1926. Jan. No. 2. pp. 31–46. With 17 text figs.

Special attention is drawn to the fact that parasites described in this paper were all studied in fixed tissues. Measurements are therefore not to be taken as indicative of the sizes of the living organisms.

A parasite resembling *Ileocystis macropodis* was found measuring in the apparently mature phase from 40 μ to 70 μ in diameter. A fairly complete range was found in which the smallest uninuclear forms measured about 8 μ in diameter up to the large mature forms mentioned. The smallest organisms occurred in the intestinal epithelium and submucosa, but the mature forms were seen in the submucosa only.

As the parasite increases in size repeated division of the nucleus occurs. Finally, the parasite is found to be filled with spores, but the stage of transition from nuclear division to spore formation was not seen.

During the process the "outer margin of the envelope tends to lose its regular definite contour, and short ill-defined processes project from it at irregular intervals. At the same time, the substance of the envelope shows a faint striation, indicating fibrillar structure, and it may, especially in the thickened region round the nucleus, become more or less coarsely vacuolated."

In the thickened submucosa lymphocytes were found containing the spores of some parasite. Only a single stage of development was observed. In these the invaded lymphocyte was greatly distended and in a vacuole-like space in the cytoplasm the somewhat club-shaped, curved spores were found. Twelve to 20 such spores could be found; but in no case was any residual body detected. Free spores were found in intercellular spaces. They measured 6 μ by 2 to 2·5 μ.

It is suggested that the organism is identical with *Lymphocystis macropodis* (Gilruth & Bull 1912).

Between the fibres of the muscular layers exactly similar spores were found, either isolated or in groups. In one part of the intestine a very heavily, but nevertheless localized, invasion with a coccidium was found.

Merozoites ranged in number from 8 to 32, and they measured 8 μ by 2 to 2·5 μ.

The microgametocytes and microgametes possessed the usual characters.

The faeces of other wallabies were examined and what is held to be the oocyst of their parasite was found. These tended to be slightly flattened on one side and measured 22–34 μ by 10–17 μ. The wall showed three layers, of which the central one was brownish in colour.

Sporocysts were fully developed within 48 hours of the passage of faeces. There was no residual body in the oocyst, but one was always present in the sporocysts.

The parasite is *Eimeria macropodis.*

KOLPAKOFF (T. A.). **Le rôle du suc gastrique dans l'immunité naturelle des lapins dans la coccidiose.** [The Part played by the Gastric Juice in Natural Immunity of Rabbits to Coccidiosis.]—*Bull. Soc. Path. Exot.* 1926. Apr. Vol. 19. No. 4. pp. 266–268.

An attempt was made by the author to ascertain the effects of gastric juice, pancreatic juice, intestinal secretions, and bile, upon coccidia in vitro. Suspensions of coccidia were placed in tubes containing the various alimentary juices and finely powdered charcoal was added to inhibit the growth of moulds. The tubes were incubated at 30°–35° C., and some were maintained at room temperature. The tests were apparently carried out with unsporulated organisms, and the observations were directed to the effect of the various secretions upon the process of sporogony.

There was no sporogony in any of the juices with the exception possibly of the gastric secretion. In control preparations in salt solution, distilled water, and tap water development took place.

YAKIMOFF (W. L.). **Sur la question de l'*Eimeria stiedae* du lapin.** [*Eimeria stiedae* of the Rabbit.]—*Bull. Soc. Path. Exot.* 1926. Apr. Vol. 19. No. 4. pp. 269–271.

As the result of observations carried out under varying conditions Yakimoff finds that under ordinary conditions of temperature and light and in a moist medium the process of sporulation requires a month for its completion.

A single case is recorded in 1922 in a young rabbit, which passed no oocysts in the faeces, and showed no lesions in the liver, organisms found in smears from the lymphatic glands (exact glands not stated.—Ed.) were identified as young coccidia. It is said that the theory of invasion of the liver by either the blood stream or the lymph stream is plausible.

YAKIMOFF (W. L.), WASSILEWSKY (W. J.), MARKOFF (E. N.) & RASTEGAÏEFF (E. F.). **La coccidiose des porcs en Russie.** [Coccidiosis of the Pig in Russia.]—*Bull. Soc. Path. Exot.* 1926. Apr. Vol. 19. No. 4. pp. 263–266.

42·8 per cent. of the pigs examined in the slaughterhouses at Petrograd have been found to be infected with coccidia.

The parasites measured 19·4–21 μ by 9–14·4 μ.

YAKIMOFF (W. L.). **Les coccidioses des animaux domestiques en Russie.** [The Coccidioses of the Domesticated Animals in Russia.]—*Bull. Soc. Path. Exot.* 1926. Apr. Vol. 19. No. 4. pp. 262–263.

Yakimoff and his pupils have detected coccidia in the faeces of cattle, sheep, goats, pigs, poultry, and snakes.

This brief paper is a preliminary note, simply recording occurrence.

SHEATHER (A. L.). **A New Species of Coccidium of the Sheep.**—*Jl. Comp. Path. & Therap.* 1926. Mar. Vol. 39. No. 1. pp. 79–82. With 1 plate.

The parasite here described is in all probability identical with that described by SPIEGL (see this *Bulletin*, Vol. 13, No. 3, p. 84).

PERARD (Ch.). **Sur la Coccidiose du Rat.** [Coccidiosis of the Rat.]—*Rec. Méd. Vét.* 1926. Feb. Vol. 102. No. 4. pp. 120–124.

The disease in rats is confined to the intestine, and as a rule produces serious results in animals under 6 months old only. The author states that polyuria is a constant symptom in rats as in other animals affected with coccidiosis. Appetite is maintained until near the end. In acute cases death takes place in a week or ten days, but if the disease runs a more chronic course recovery as a rule takes place. In acute cases there is very extensive destruction of the intestinal mucous membrane, and secondary bacterial infections frequently occur.

The parasite is a rather rounded one and measures on an average 23 μ by 18 μ. Sporulation requires from two to four days, according to the temperature. Sporoblast formation leaves no residual body, but each sporocyst contains a large residual body when sporozoite formation occurs.

The author believes that the experiments carried out by himself and others indicate that the coccidium is not identical with *E. falciformis* of the mouse.

He draws attention to the fact that while there is a family resemblance between rats and mice, there is one anatomical feature in which they differ from each other markedly, and that is that whereas the mouse has a gall bladder, the rat has none.

YAKIMOFF (W. L.). **Der Kampf gegen die Rinderpiroplasmose in Petrograder (Leningrader) Gouvernement im Jahre, 1924.** [The Campaign against Bovine Piroplasmosis in the Petrograd Province in 1924.]—*Ztschr. f. Infektions. parasit. Krankh. u. Hyg. d. Haust.* 1926. May. Vol. 29. No. 2. pp. 83–99.

The bulk of this paper is made up of tabular statements giving various combinations of factors, e.g. age of animals, the period of infection at which treatment was given, the intervals elapsing between the administration of treatment and the drop in temperature, the relationship of the drop of temperature to the disappearance of redwater in point of time.

The average percentage mortality after treatment with trypanblue is 8, but mortality is lower in cases which come under treatment early than in those in which it is delayed.

A few cases have been treated with satisfactory results with ichthargan and luargol, but their number is too small to be of any value for appraising the worth of these drugs.

YAKIMOFF (W. L.). **La campagne anti-piroplasmique dans le gouvernement de Pétrograde en 1925.** [The Campaign against Piroplasmosis in the Province of Petrograd in 1925.]—*Bull. Soc. Path. Exot.* 1926. Jan. Vol. 19. No. 1. pp. 14–15.

Ichthargan, protargol, luargol, silver salvarsan, arrhénal, and apiroplasmine, have been used for the treatment of 773 animals.

From a tabular statement it appears of 743 animals treated with one or other of these drugs 44, or 5·9 per cent., died; of 121 left untreated 52, or 42·9 per cent., died.

Apiroplasmine is a mixture of drugs the composition of which is given below.

YAKIMOFF (W. L.). **L'ichtargan dans le traitement de la babésiellose bovine du nord-ouest de la Russie.** [Ichtargan in the Treatment of Bovine Babesiellosis in North West Russia.]—*Bull. Soc. Path. Exot.* 1926. Jan. Vol. 19. No. 1. pp. 16–18.

This brief paper contains tabular statements of the number of animals treated, the time of disappearance of haemoglobinuria, and the time elapsing before the temperature fell.

In native animals the percentage mortality after treatment was 2·3, in imported animals 11·8.

No details of dosage, etc., are given.

YAKIMOFF (W. L.), GALOUZO (J. G.), LOUKIANOFF (W. A.) & FURIKOFF (M. J.). **L'apiroplasmine dans le traitement de la piroplasmose bovine.** [Apiroplasmine in the Treatment of Bovine Piroplasmosis.]—*Bull. Soc. Path. Exot.* 1926. Jan. Vol. 19. No. 1. pp. 18–21.

Apiroplasmine is prepared by G. ALESSANDRINI in Rome and has the following composition:—

Cacodylate of Caffeine	30 per cent.
Benzoin monocarbonic Acid ..	10 per cent.
Sodium phenate	2 per cent.

As a result of trial on four cases the authors conclude that the solution is not of any great value.

YAKIMOFF (W. L.), MARKOFF-PETRASCHEWSKY (E. N.), GALOUZO (J. P.), LOUKIANOFF (W. A.), WOITZEKHOWSKY (A. M.) & YAKOWLEFF (S. P.). **Le traitement de la piroplasmose bovine par le salvarsan à l'argent (Silbersalvarsan).** [The Treatment of Bovine Piroplasmosis by means of Silver Salvarsan.]—*Bull. Soc. Path. Exot.* 1926. Jan. Vol. 19. No. 1. pp. 34–41.

Eight cases have been treated by intravenous injections of 1 per cent. solution in sterile water, made up without heat.

The bulk of the paper is occupied by details of leucocyte counts before and after treatment.

Seven of the animals recovered, the dose in each case being 1 gramme of the drug.

The authors consider that silver salvarsan is useful for the purpose, but that possibly larger doses, up to 1·5 g., should be given.

YAKIMOFF (W. L.), MARKOFF-PETRASCHEWSKY (E. N.), GALOUZO (J. G.), LOUKIANOFF (W. L.), RASTEGAÏEFF (E. F.), ROUMIANZEFF (E. W.) & WOITZEKHOWSKY (A. M.). **Essais de traitement de la piroplasmose bovine par le protargol.** [The Treatment of Bovine Piroplasmosis by Protargol.]—*Bull. Soc. Path. Exot.* 1926. Jan. Vol. 19. No. 1. pp. 41–49.

The drug was used in a 1 per cent. solution in sterile water, solution taking place in the cold, and was injected intravenously. It is perhaps

a little difficult to be sure that one may rely upon the tabular statement of the results obtained, as it appears to contain at least one misprint.

Thirteen cases are referred to. Ten of these recovered after doses ranging from 0·5 to 1·5 g. of the drug.

Two cases were also treated with ichthargan, and one further animal died.

BRAGA (Americo) & FONSECA (Affonso). **Contribuição experimental ao estudo hematologico e urologico da Anaplasmose bovina** [Haematological and Urological Studies in connexion with Bovine Anaplasmosis.] Rio de Janeiro. Posto Exp. Vet. Districto Federal. 15 pp. With 2 charts.

This paper contains the results of examination of the blood and urine of six bovines before, during, and after an attack of anaplasmosis produced by inoculation.

It appears that the amount of urea in the blood rises during the attack as a rule and subsequently falls very considerably.

The salts in the urine fall during attack and then rise to a little above the normal level during recovery.

There is a very marked drop in the haemoglobin figure of the blood. The corpuscular content may fall to about 30 per cent. of normal. The leucocyte formula is also given at the three stages.

DESCAZEAUX (J.). **Spirochétose cutanée du porc.** [Cutaneous Spirochaetosis of the Pig.]—*Bull. Soc. Path. Exot.* 1926. Feb. Vol. 19. No. 2. pp. 86–88.

Cutaneous spirochaetosis of the pig, which has been recorded in many parts of the world, is now reported from Chili.

The disease is enzootic in certain places, attacking particularly the young pigs and causing ulceration of the mucous membranes and swellings on the head and testicles. The lesions first appear as dark red patches, and later necrosis and shedding of the superficial layers occurs.

The spirochaete, which is constantly found in the lesions, is a slender organism measuring 7 to 10μ and showing 2–3 turns.

All attempts to cultivate it have failed, and attempts to infect guineapigs and rabbits have not succeeded. Similarly, intracutaneous and subcutaneous inoculation of healthy pigs does not transmit the infection. No evidence has been obtained that the pig louse (*Haematopinus suis*) plays any part in the transmission of the disease.

In almost every case the author has found in pus from "open" lesions "actinomycotic grains," but it has not been possible to produce an infection with this organism. It is suggested that it is in the nature of a secondary invader.

BERGE (R.). **Ein Fall von Hühnerspirochätose in Deutschland.** [A Case of Spirochaetosis of the Fowl in Germany.]—*Deut. Tierärzt. Woch.* 1926. March 6th. Vol. 34. No. 10. pp. 169–172. With 1 text fig.

DISEASES DUE TO METAZOAN PARASITES.

McKay (A. C.). **An Intermediate Host of *Fasciola hepatica* in New South Wales.**—*Jl. Australian Vet. Assoc.* 1926. March. Vol. 2. No. 1. pp. 9–14.

The author's investigations have been concerned with the determination of the fresh-water molluscs to be found in districts of New South Wales known to be infested with fluke, and the identification of the snail or snails concerned in the transmission of *Fasciola hepatica*. In the course of visits to various parts of the country the author has obtained specimens of the following snails :—

Bullinus gibbosus, Limnaea lessoni, L. brazieri, B. productus, B. proteus, B. aciculata, B. fusiformis, B. tenuistratus, Segmentina australiensis, B. hainesii, Gabbia australis, Planorbis macquariensis, B. pectorosus.

Examination for rediae and cercariae has not yet been completed for all species. *L. brazieri* has, however, been found to be heavily infested.

Three types of cercariae were found in *Limnaea brazieri*, and one of these was proved by experiment to be that of *Fasciola hepatica*.

L. brazieri was found only in alkaline waters, and cercariae only escaped in water of the same reaction. The temperatures of the water ranged from 15° to 24° C. A single snail of this species may excrete over a thousand cercariae. These are capable of encysting on grass or even free on the surface of water, but contaminated herbage is the more serious source of danger.

The author is unable to confirm Bradley's statement that fluke eggs do not develop or develop very slowly at cold room temperatures and in the dark. His own experience is opposed to this.

Issaitchikoff (J. M.) & Weinberg (M.). **Sur le développement du Trematode *Cryptocotyle concavum* (Creplin, 1825).** [The Development of the Trematode *Cryptocotyle concavum* (Creplin, 1825).]—*C.R. Soc. Biol.* 1926. Feb. Vol. 94. No. 5. pp. 305–307. With 1 text fig.

This parasite is not found exclusively in birds, but also in dogs, cats, and other animals. Infestation results from the ingestion of fish harbouring the larvae in the intestine and the gills.

Alceo (Gurini). **La "Bilharzia crassa" negli ovini Sardi.** [*Bilharzia crassa* in Sardinian Sheep.]—*La Clin. Vet.* 1926. Feb. Vol. 49. No. 2. pp. 78–81.

The author states that this is in the nature of a preliminary note, as his observations are not yet complete. He has found the parasite in 5 animals out of about a hundred examined.

Schwarz (Benjamin). **Parasitic Nematodes from China.**—*Proceedings United States National Museum.* 1926. Vol. 68. Article 13. pp. 1–10.

"The lists of species given in the following pages contain not only many new records, but also represents an attempt to systematize our knowledge of these parasites from China."

A new species *Subulura chinensis* from *Scops stictonotus* is described. For the rest the interest of the paper is mainly in connexion with distribution of known parasites.

CASTELLI (Agostino). **Una nuovo specie di Nematode** (*Micronematodum ovis*, **n. sp.) patogena per gli ovini.** [A New Species of Nematode (*Micronematodum ovis* n. sp.) of the Sheep.]—*La Nuova Veterinaria.* 1926. March 15. Vol. 4. No. 3. pp. 64–68.

The worm described is held to be accountable for a large number of deaths in sheep in Sardinia. The symptoms were those of wasting and anaemia, and in many instances death occurred within a fortnight of the onset of symptoms. The parasites were detected in minute whitish nodules present in the lungs.

As the worm appears to be quite unlike anything previously described, the author suggests the creation of a genus *Micronematodum* for it, and names the species as above.

The adult worms are said to have a length ranging from 25 to 30 μ, and a maximum thickness of 2 μ. [Measurements are as in original.]

The larvae measured 10 to 12 μ by 2 to 3 μ, the eggs 8 to 9 μ by 4 to 5 μ. In some of these the larvae could be distinguished.

SEBASTIANO (Raffaelli). **Presenza di Gongylonema nell'apparecchio digerente degli Animali da macello di Ravenna e dintorni.** [Gongylonema in the Alimentary Tract of Butchers' Animals at Ravenna.]—*La Clin. Vet.* 1926. May. Vol. 49. No. 5. pp. 296–301. With 2 text figs.

The author examined the carcasses of 1,970 bovines and found gongylonema in the oesophagus of about 20 per cent. The majority occurred in the lower part of the gullet.

In the case of sheep, of which 2,800 were examined, the percentage of infected animals was 70. In some of these immense numbers (up to 200) were detected.

Three hundred and thirty pigs were examined and only one was found infected. In this case 12 worms were present.

The organs of 15 horses were examined, but the parasite was not found.

Four hundred and ninety head of poultry were examined and small specimens of gongylonema were found under the lining membrane of the crop of one of these. These measured about 3·5 cm. long.

JACK (R. W.). **Tsetse Fly in the Lomagundi District.**—*Rhodesia Agric. Jl.* 1926. Feb. Vol. 23. No. 2. pp. 134–150. With 2 plates and 1 map; and No. 3. pp. 257–267. With 2 plates.

As a result of the spread of tsetse in the area and the losses of cattle a conference was held at Salisbury in April 1925 with a view to taking steps to deal with the danger.

The author describes at some length the area of country to be covered by the experiment undertaken.

There has been an increase in game in the district of recent years, and this is thought to be due in part to the low market value of hides, etc., and in part to the detection of sleeping sickness in the Sebungwe district, the presence of tsetse fly affording protection to the game.

Records show that during recent years there has been a considerable extension of the fly area.

Two undertakings were considered at the conference, viz. : The clearing of a barrier to arrest the spread of the fly and a vigorous campaign against game by means of controlled hunting.

The objections to clearing a barrier are that it is not known how wide the clearing would have to be, and the exact limit of the fly being unknown the position of the barrier would present great difficulties.

In the author's opinion the clearing would have to be some miles wide, and further he thinks that the policy of elimination of game by hunting is not likely to achieve the desired result.

Grass fires as tested by SWYNNERTON in East Africa do not appear to offer any chance of reducing the danger in Rhodesia on account of the differences in the types of country involved, and a further objection is the difference in the density of population and the corresponding difficulty of burning effectively.

The author proceeds to describe in detail the formation of barriers on either side of an area freed as far as possible from game, with the idea of interposing a gameless buffer zone between the fly and the farms.

A line 100 yards wide has been cleared on each side of the area and through the centre of this has been run a barbed wire fence 6 feet high.

An account is given of the clearance of the area of game.

RODHAIN (J.). **Existence d'un foyer de Glossines du groupe** *morsitans* **dans le Bas-Ouellé.** [A Centre of Glossina of the Morsitans Group in Lower Ouellé.]—*Bull. Soc. Path. Exot.* 1926. Mar. 10. Vol. 19. No. 3. pp. 197–198.

The author records the capture of a specimen of *G. morsitans* near the village of Caré—between the parallels 4° and 5° N. and near the parallel 25° E.

SMIT (Bernard). **Sheep Blow-Fly Control. Fly-traps and their Construction.**—*Jl. Dept. Agric. Union of S. Africa.* 1926. Feb. Vol. 12. No. 2. pp. 132–143.

In controlling flies trapping is only a supplementary measure. The first step is the destruction of breeding places. This has been dealt with in a previous article (*ante*, p. 17).

The number of flies caught is not always an indication of the amount of good that trapping is doing. The destruction of a small number of flies in winter is responsible for a great reduction in number during the summer.

The improved trap described by the author is constructed as follows :

Two paraffin cans are placed one above the other and held in position by a wide strip of sheet metal.

The upper tin is the trap proper and contains a wire gauze cone or pyramid with its apex about three inches from the top of the tins.

Figs. 1, 2 and 3 (pp. 96–97) show more clearly than a lengthy description the details of construction of the trap.

Decaying meat forms a very good bait, but it must be remembered that putrefaction is more rapid in summer than in winter and that therefore bait remains attractive longer in the cold weather. The bait receptacle is filled to within an inch of the fly entrances, and a quart or so of water poured over it, but the water should contain a weak solution

of tobacco to prevent maggots developing in the bait. One part of tobacco extract containing 8 per cent. nicotine in 50 parts of water is effective.

Traps should be set near rivers and dams and in sheltered bush rather than in the open. Similar traps baited for house flies should be kept near the house, preferably close to the stables.

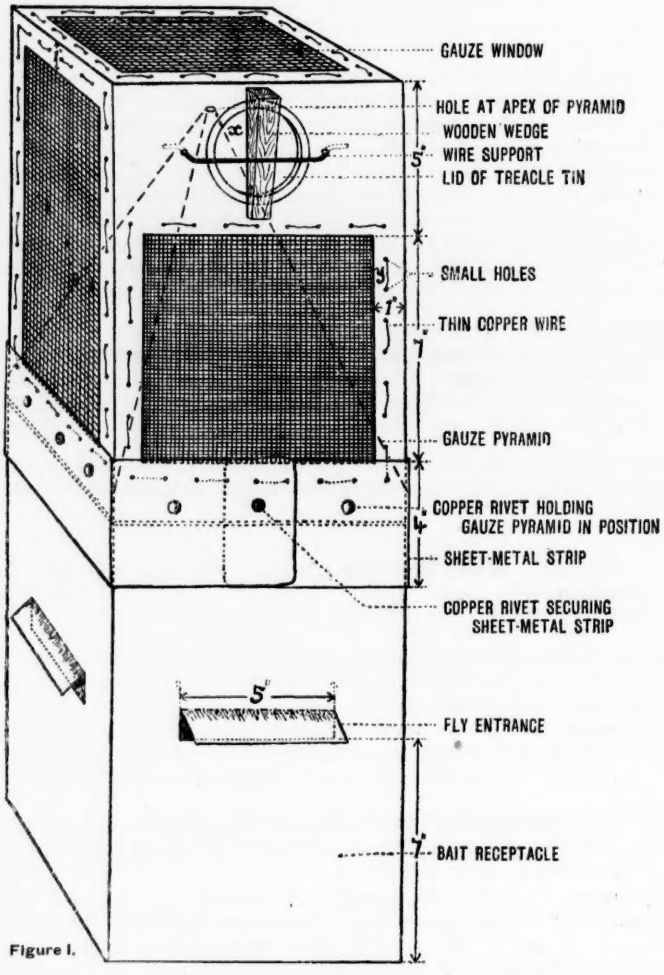

Figure I.

[Reproduced from *Jl. Dept. Agric. Union of S. Africa.* 1926. Vol. 12. No. 2.]

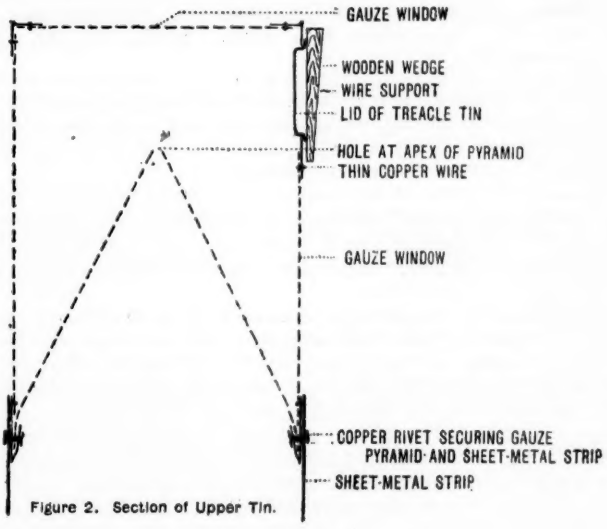

Figure 2. Section of Upper Tin.

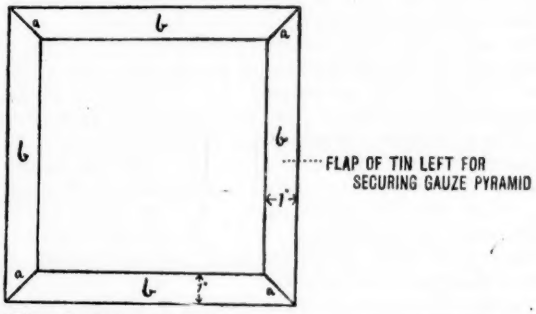

Figure 3. Bottom of Upper Tin.

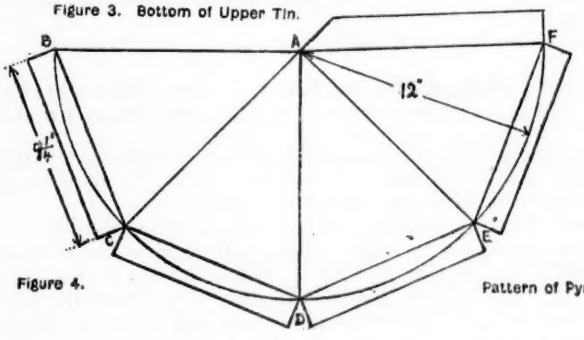

Figure 4. Pattern of Pyramid.

[Reproduced from *Jl. Dept. Agric. Union of S. Africa.* 1926. Vol. 12. No. 2.]

DROUIN (V. F.). **Prevention et Traitement de l'hypodermose du Boeuf.** [Prevention and Treatment of " Hypodermosis " of the Ox.]—*Rev. Gén. Méd. Vét.* 1926. April. Vol. 35. No. 412. pp. 184–195.

A new campaign against *Hypoderma bovis* is to be begun, the previous plan having been interrupted by the war, and in this paper the author summarizes the attempts already made to deal with this pest and gives an account of his own experiments.

Spraying the parts of the animals with liquids repellent to the fly has not so far proved successful in practice; dipping tanks which are used for the destruction of ticks have been proved to reduce the damage done by hypoderma, but the expense prevents general adoption for the latter purpose alone.

Something can be done in certain cases by stabling or providing shade for animals under 18 months, which are the most frequently attacked, during the day from June to September. But the author thinks that the most practical way of attacking the problem is to deal with the larvae in the definitive position under the skin during the spring. The larvae should be attacked as soon as possible after they establish themselves in this position, as they are then more vulnerable, and if killed are readily absorbed without suppuration.

Hand extraction is obviously impossible when animals are heavily infested, and further it is to be remembered that crushing a larva in situ may lead to the production of alarming symptoms.

The author enumerates various substances which have been suggested as local dressings for the destruction of the larvae, but to nearly all of these some objection can be raised. He has had most favourable results with paradichlorobenzene, and this he used as an ointment made up with 5 parts of vaseline to one of the drug.

The hair is clipped over the orifice and the ointment applied with a spatula. It may be repeated twice with intervals of a few days.

The drug is not very expensive, costing 6 to 10 francs per kilog., and is readily obtained commercially.

Another substance upon which the author based considerable hope of success was fluosilicate of soda.

The results, however, were not so good, and in addition the drug was more costly.

KEANE (P. M.). **A Light-Trap for Flies.**—*Jl. Roy. Army Med. Corps.* 1926. June. Vol. 46. No. 6. pp. 450–452. With 3 text figs.

The trap described is inefficient unless the room in which it is installed can be made absolutely dark. A " chink " under the door, or some reflection inside the room may render the trap useless.

Essentially the trap comprises a box with a small opening on one side and a large one on the other. The small opening (about 4 inches by 1) has fixed in it two pieces of glass. One of these is in close contact with the bottom and sides of the opening. The other overlaps it leaving a space of about $\frac{1}{4}$ inch between them and with a similar space between its top edge and the margin of the opening. The large opening is glazed. The trap is fixed with the small opening towards the interior of the room. When the room is darkened the flies attempt to make their way out and pass between the overlapping pieces of glass into the box, where they can be killed with pyrethrum.

COMPTON (A.). **Phthiriasis of the Mouse, *Haematopinus muris*, with Observations on Treatment by Salicylidene Compounds.**—*Vet. Jl.* 1926. May. Vol. 82. No. 5. pp. 255–257.

The author describes the clinical picture presented by infested mice, and gives a description of the parasite.

Photomicrographs of the male and female are given.

ARNDT (H. J.). **Zur Pathomorphologie zooparasitärer Leberveränderungen (Echinokokkose und Distomatose).** [The Histology of the Lesions caused by Echinococcus and Distomes in the Liver.]—*Ztschr. f. Infektions. parasit. Krankh. u. Hyg. d. Haust.* 1926. May 3. Vol. 29. No. 2. pp. 100–123.

LIESZ (J.). **Über eine Demodex Invasion bei einer Ziege.** [A Case of Follicular Mange in a Goat.]—*Deut. Tierarzt. Woch.* 1926. Feb. 6. Vol. 34. No. 6. pp. 93–95. With 3 text figs.

MONTGOMERIE (R. F.). **The Treatment of Liver Rot with Preparations of Male Fern. A Historical Survey.**—*Jl. Comp. Path. & Therap.* 1926. Mar. Vol. 39. No. 1. pp. 38–42.

SKRJABIN (K. I.). **Infestation simultanée d'un oiseau par 17 espèces d'helminthes.** [The Simultaneous Infestation of a Bird with Seventeen Species of Worms.]—*C.R. Soc. Biol.* 1926. Feb. Vol. 94. No. 5. pp. 307–308.

BACTERIAL DISEASES.

FUJIMURA (Seiichi), TOYOSHIMA (Takeo) & SUENAGA (Takeo). **Contribution to the Biological and Serological Study of *B. abortus equi*.** *Jl. Jap. Soc. Vet. Sci.* 1926. March. Vol. 5. No. 1. pp. 15–18.

The bacillus of mare abortion elaborates a toxin which is most potent at about 5 weeks' incubation, and after that declines. The filtrate, by intravenous injection of ·05 to 1·0 cc. into rabbits and guinea-pigs, caused dyspnoea, weakness of the hind legs, diarrhoea and death in from 30 to 70 minutes. In some animals recovery took place.

Subcutaneous injection of sublethal doses of filtrate protected against a second dose a fortnight later.

By agglutination tests the authors have been able to distinguish the organism from members of the paratyphoid-enteriditis group.

In order to obtain the typical dry wrinkled growth upon agar it is essential that the culture medium should have a pH lying between 6·0 and 8·4.

OHLSSON (Lorenz). **Testikelförändringar hos tjur förorsakade av infektion med Bangs Abortbaciller.** [Changes in the Testicle caused by Bang's Bacillus.]—*Skandinavisk Vet.-Tidsk.* 1926. Feb. Vol. 16. No. 2. pp. 25–37.

The author describes the findings in two cases of orchitis caused by the abortion bacillus.

There was marked hyperplasia of the connective tissue and necrosis of the essential tissue.

CONNAWAY (J. W.), DURANT (A. J.) & NEWMAN (H. G.). **Contagious Abortion Investigations.**—*Missouri Station Bulletin, 228.* 1925. pp. 84–86. Ex. *Exp. Station Record.* 1925. Oct. Vol. 53. No. 5. p. 480.

Abortion in swine is due to *B. abortus* Bang., and the general features of the disease are identical in the two species. Newborn pigs give positive serum tests as a result of ingestion of antibodies with colostrum. Occasionally antibodies make their escape into the circulation of pigs in utero.

It is suggested that there is a lesion of the placenta to account for this.

The duration of the persistence of antibodies ingested with the colostrum in the serum appeared to be proportional to the amount of antibody ingested.

NELSON (J. B.). **A Rapid Method for the Isolation of *Bacillus abortus* from Uterine Exudate and Diseased Placenta.**—*Jl. Exp. Med.* 1926. Mar. 1. Vol. 43. No. 3. pp. 331–338.

The author describes a technique to replace the method of guineapig inoculation with subsequent cultivation from the spleen after about 3 weeks. It is based upon SMITH's observation that whereas in the peritoneal cavity most bacteria, other than spores, are killed, the abortion is not.

After intraperitoneal inoculation with the suspected material one of the guineapigs is chloroformed to death on the fifth day. The peritoneal cavity is flushed out thoroughly with several cubic centimetres of broth, and after it has been introduced and withdrawn a number of times half a cubic centimetre of the broth is used for the inoculation of agar slants. Then the spleen is exposed and a fragment is torn off and transferred to each of the slants. The tubes are incubated in a jar with an atmosphere of 5 per cent. carbon dioxide. Growth develops in 2 to 7 days and usually without contaminations. Should no growth take place or should there be heavy contamination the second guineapig is used in the same way. Should this fail the third is used for spleen culture at three weeks.

It is noteworthy that in no case, out of twelve of which details are given, were any gross lesions found in the spleen.

The organism was obtained from the spleen as early as the third day, and regularly by the fifth day.

SMITH (Theobald). **Variations in CO_2 Requirements among Bovine Strains of *Bacillus abortus*.**—*Jl. Exp. Med.* 1926. Mar. 1. Vol. 43. No. 3. pp. 317–325.

This paper does not lend itself to abstraction, as it is largely concerned with a description of technique for cultivation purposes and with detailed statements of the results obtained.

The author's conclusions are as follows:

Strains of *Bacillus abortus* freshly isolated vary in their CO_2 requirements.

The origin and sources of the strains growing with less dependence on CO_2 (or sealing) may be in vaccinal strains or possibly in continued existence in the udder. The importance of these possibilities makes it desirable that all strains isolated should be subjected to some such test as is outlined in these pages.

SMITH (Theobald) & LITTLE (Ralph B.). **Further Data on the Effect of Vaccination against Bovine Infectious Abortion.**—*Jl. Exp. Med.* 1926. March 1. Vol. 43. No. 3. pp. 327–330.

The authors give details of the results obtained using dead and living vaccines. Four doses of dead vaccine were given, two before, and two after service. A single dose only of living vaccine was given.

The abortion rate among the herd (118 head) was 27·1 per cent. After dead vaccine it was 26·3 the first pregnancy (34 head) and 23·3 the second (30 head). Of those given live vaccine (9 animals) none aborted at the first or second pregnancy.

BUCK (J. M.) & CREECH (G. T.). **Abortion-Bacterin Treatment of Cows having Udders infected by** *Bacterium abortus*.—*Jl. Agric. Res.* 1925. Oct. Vol. 31. No. 7. pp. 663–684.

Experimental work was carried out with a herd in which contagious abortion was known to have existed for about 5 years. Thirty of the animals were reactors.

Repeated injections were given of a suspension of the organism containing approximately 1 billion organisms per cubic centimetre. The suspension was killed by heating in a water-bath at 60° C. for half an hour.

The bulk of the paper consists of tabular statements dealing with various aspects of the problem.

The authors conclude that repeated injections of dead bacilli do not achieve any result with regard to clearing up abortion infection in the udder.

From their results there emerges the fact that eight out of a group of 15 cows with infected udders continued to pass out infected milk for about 2 years.

Serum may continue to give positive agglutination tests for at least a year after disappearance of infection from the udder, as indicated by guineapig inoculation tests.

WITTE (J.). **Vergleichende Untersuchungen über die Verwertbarkeit der Komplementbindung mit aktivem und inaktivem Serum sowie mit der Agglutination bei der Diagnose des seuchenhaften Verkalbens.** [Comparative Experiments with Active and Inactive Serum in the Complement Fixation Test and with Agglutination in the Diagnosis of Contagious Abortion.]—*Ztschr. f. Infektions. parasit. Krankh. u. Hyg. d. Haust.* 1924. Nov. Vol. 27. No. 3. pp. 207–217.

The author finds that while the agglutination test yields sharply defined diagnoses, there are cases in which results are doubtful, and these are detected by the complement fixation test.

If active serum is used for the complement fixation test the risk of deviation of the complement is avoided; the results with positively reacting sera are in agreement with those given by the agglutination test.

Haemolytic sera which with inactive sera inhibit haemolysis in a nonspecific manner, with active sera behave in a manner that leaves no room for doubt.

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NICOLAS (E.). **Intradermo-vaccination anticharbonneuse en deux temps des chevaux et mulets de l'armée française du Levant en 1925.** [Intradermal Vaccination against Anthrax of Horses and Mules in the French Army of the Levant in 1925.]—*C.R. Soc. Biol.* 1926. Feb. Vol. 94. No. 5. pp. 336–337.

During the years 1919 to 1923 no anti-anthrax vaccinations were carried out owing to the danger of the subcutaneous method.

In 1924 8,912 animals were vaccinated intradermally, two doses being given at a six-days' interval. Only four deaths occurred from anthrax. These were sporadic. There were no actual outbreaks. During 1925 the same procedure was adopted, and 6,904 animals were vaccinated. There were only 5 deaths. It is the more remarkable since 1925 was an "anthrax year," and the losses, mainly among sheep, but also involving cattle, pigs, and horses, amounted to over 7,000 head.

Local swellings as a result of vaccination were about 5 times as frequent in 1925 as in 1924. The winter was exceptionally severe, and is blamed for this increase in the number of local reactions.

The inoculations are carried out during the cold weather.

TATIN & VELU. **La vaccination du cheval contre le charbon bactéridien par voie intradermique en un temps.** [Intradermal Vaccination of Horses against Anthrax with a Single Dose.]—*C.R. Soc. Biol.* 1926. Feb. Vol. 94. No. 5. pp. 334–336.

During 1925 3,140 native horses have been immunized by the single dose intradermal method in Morocco, without an accident of any kind and, in fact, without any one of them showing any reaction.

Two hundred and fifty French horses were also vaccinated in the same way. Of these 95 were animals in hospital for various reasons. Among these there were some which showed local reactions, but there was practically no systemic disturbance.

MONOD (Th.) & VELU (H.). **La vaccination intradermique contre le charbon bactéridien d'après les results pratiqués.** [The Results of Intradermal Vaccination against Anthrax.]—*Rec. Méd. Vét.* 1926. Feb. 28. Vol. 102. No. 4. pp. 72–79.

During 1925 over 130,000 doses of anthrax vaccine for intradermal use have been prepared by the authorities in Morocco. A tabular statement shows the number of animals of different species inoculated each month. From January to June the vaccinations were precautionary; from that time onwards they were carried out while outbreaks were actually in existence. As during 1924, the Veterinary Surgeons using vaccine were requested to collect all particulars in connexion with it, and the present report is based upon the figures and facts so collected.

At the outset the authors state that the conclusions previously drawn have been amply confirmed. A single intradermal vaccination establishes a solid and durable immunity; the method can be used even when an outbreak is in progress; animals may be vaccinated at one and the same time against anthrax, blackquarter, and pox.

The immediate effects of vaccination are negligible. In a few horses there has been a temporary local reaction. In one animal vaccination led to a relapse of piroplasmosis.

In a few instances the immunity was reported to have broken down, but on strict enquiry being made it was established that the animals which died had not been vaccinated.

Instances are given in which the vaccination was carried out during outbreaks, and in all cases the mortality came to a stop within a very short time.

It is difficult to determine the duration of the immunity because it is impossible to imitate natural infection, but facts gathered in the field indicate that it is serviceable for 7 or 8 months.

In one case the evidence appeared to show that at nine months it was no longer certainly serviceable.

SOITUZ (S.). **Séro-vaccination anticharbonneuse intradermique chez le cheval.** [Intradermal Vaccination against Anthrax in the Horse.]—*Archiva veterinara.* 1926. Vol. 19. Nos. 1-2. pp. 1–3.

It is difficult to get a clear idea of the author's experiments, as he appears to state that he has injected quantities of serum and vaccine ranging up to 5 cc. (cmc. is the symbol used in the original) intradermally. It is also noted that the same symbol (cmc) is used in the description of the area scarified for the application of vaccine, thus—100–200 cmc.

ANDRIEU (Alejandro). **Accidentes de las vacunas e Inmunidad anticarbunclosa. 1a Comunicacion.** [Accidents from the Use of Anthrax Vaccine and Immunity against Anthrax.]—*Revista de Med. Vet.* Buenos Aires. 1925–26. Oct.–Mar. Vol. 8. Nos. 4–6. pp. 111–118.

This is an interesting paper illustrating the practical difficulties in the prophylaxis of anthrax. Accidents are usually due to one of two causes, either an impure product or too large a dose, and, in the latter connexion, it is important to note that a dose easily tolerated by one animal may prove fatal to another. Cases are recorded in which two doses of vaccine were given to a large number of cattle, and 11 per cent. died within a fortnight; the vaccine was found to contain cocci in large numbers. On other farms the mortality was higher and three vaccinators developed malignant pustules. If the animals are sent up-country or by rail journey the risk is greater; also debilitated animals appear to bear vaccine badly.

In view of BESREDKA'S work on tissue immunity the author experimented with guineapigs and showed that intradermal inoculation produced a greater degree of immunity than either cutaneous or subcutaneous inoculation.*

MORITA (Heijiro). **An Experimental Study of the Pathology of Black-Leg.**—*Jl. Jap. Soc. Vet. Sci.* 1926. March. Vol. 5. No. 1. pp. 1–7.

The author describes three stages in the changes produced in the muscles involved in black-leg lesions, cloudy swelling, waxy degeneration, and myolysis.

He states that the rancid odour was not noticed in the carcases examined. Gas formation is said to be very slight and recognizable by microscopic examination only. It is held to be mainly a post-mortem change and of no significance.

Summarized by Dr. H. Harold Scott.

In inoculated guineapigs the presence of bacilli in the blood-stream is said to be passive only. There is no true septicaemic condition. Changes in the adrenals are referred to as significant.

LECLAINCHE & VALLÉE. **A l'occasion du charbon symptomatique.** [With Reference to Black-Leg.]—*Rec. Méd. Vét.* 1926. Feb. 28. Vol. 102. No. 4. pp. 113–119.

In this paper the authors reply to a charge of having taken results from a paper by another author and of having incorporated them in one of their own.

They point out that their conclusions are diametrically opposed to those held by the author in question.

This paper must be consulted in the original for details.

DESCOMBEY (P.). **Sur la vaccination antitétanique du cheval. Durée de l'immunité.** [Anti-tetanic Vaccination of the Horse. Duration of the Immunity.]—*C.R. Soc. Biol.* 1926. Feb. 5. Vol. 94. No. 4. pp. 253–254.

The author gives brief details of a number of tests carried out with serum from horses immunized by means of anatoxin.

The results indicated that where there was a decline in the neutralizing power of the serum from different animals from the 6th month after immunization onwards, at the end of twelve months 1 cc. of serum was sufficient to neutralize 1 cc. of toxin.

DESCOMBEY (P.). **Immunisation antitétanique du cheval. Effets des injections d'anatoxine sur des sujets antérieurement vaccinés.** [Immunization of the Horse against Tetanus. The Effects of Injections of Anatoxin on Animals previously Vaccinated.]—*C.R. Soc Biol.* 1926. Feb. Vol. 94. No. 5. pp. 315–316.

The author has shown that horses injected twice with anatoxin acquire a solid immunity against tetanus and that this immunity lasts for a year or more.

In the present paper he records the results of a repetition of the vaccination.

Horses which had been vaccinated a year previously were first given 10 cc. of pure tetanus anatoxin, and a week later the same dose with some sterile tapioca added to it.

The animals were bled for testing the serum just before the second injection was given, and a week after it.

One cubic centimetre of serum from the first bleeding was found to neutralize 10 lethal doses of toxin. Thus the titre of the serum was twice as high as the maximum obtained by the immunization a year before.

Blood taken seven days after the injection of anatoxin and tapioca yielded a serum of which 0·02 cc. completely neutralized in vitro 100 lethal doses of toxin. With a view to comparing these results with those obtained by serotherapy the author injected 10 cc. of Pasteur Institute antitetanic serum into a horse. Four days later 1 cc. of serum neutralized 10 lethal doses of toxin. Serum taken 15 days after injection neutralized toxin only in the proportion of 1 cc. per 1 lethal dose.

JACOTOT (H.). **Sur la tuberculose des bovidés en Annam.** [Bovine Tuberculosis in Annam.]—*Ann. Inst. Pasteur.* 1926. April. Vol. 40. No. 4. pp. 309–313. With 2 charts in text.

During the period 1922–26 post-mortem examinations have been carried out on 1,500 bovines ranging from 1 year to 2½ years old, and 3 cases of tuberculosis have been detected.

Four hundred and sixty-five cows have been tested by the intradermal palpebral test, without a single reaction being obtained. Three hundred and twenty calves of these cows all under two years of age have also been tested with the same result. These animals all belonged to the Institut Nha-Trang.

Two hundred and thirty calves ranging from one to three years purchased for serum production yielded one positive and one doubtful reaction. Of 380 oxen purchased for serum production or for work 6 yielded positive reactions.

TEPPAZ (L.). **Les tuberculoses animales en Afrique occidentale française.** [Animal Tuberculosis in French West Africa.]—*Rec. Méd. Vét.* 1926. April 15. Vol. 102. No. 7. pp. 213–214.

Tuberculosis is of very infrequent occurrence in zebras and pigs in French West Africa.

GONZÁLEZ RUIZ (Maximiliano). **Sobre un comentario a la septicemia hemorrágica del ganado vacuno en las montañas de León.** [Haemorrhagic Septicaemia among Cattle in the Uplands Districts of León.]—*Rev. Hig. y Sanidad Pecuarias.* 1925. Nov. Vol. 15. No. 11. pp. 743–746.

The author some time ago stated that a certain disease which proved fatal to a considerable number of cattle in the hilly districts of León (Spain) was a form of haemorrhagic septicaemia. The chief symptoms were a very loose diarrhoea with flakes of fibrin, mucus, and blood. There may also be peritonitic, or, in the pulmonary form, pleuritic effusion, blood-stained, yellowish red in colour. FERRERAS appears to have disputed this and maintains that the condition is a distomiasis. The author returns to the charge and affirms that he is well acquainted with both diseases and that they are quite distinct. The septicaemia cannot be definitely proved because the actual organism has not yet been isolated, but the " incubation-period " is 5–7 months [he appears to mean that new arrivals are attacked after this interval], the disease is not contagious from case to case direct but apparently exists in the soil, pasture, or stalls; finally, ethereal extract of Malefern readily cures the helminthic infection, but has no effect upon the other.*

SOBERNHEIM (G.) & IMANISHI (K.). **Immunisierungsversuche mit keimfreien Filtraten und mit Kulturverdünnungen des Oedembazillus (R. Koch).** [Immunization Experiments with Germ-free Filtrates and Culture Dilutions of the Oedema-bacillus, Koch.]—*Ztschr. f. Infektions. parasit. Krankh. u. Hyg. d. Haust.* 1924. Nov. Vol. 27. No. 3. pp. 161–170.

It is generally accepted that the principal cause of blackquarter is the well-known bacillus of blackquarter, but no explicit answer can be

* Summarized by Dr. H. Harold Scott.

given to the question as to how many other bacteria are capable of producing a similar condition.

Recently the detection of the blackquarter bacillus has become less frequent, other anaerobes, and particularly the bacillus of malignant oedema, being found instead.

The blackquarter bacillus forms smaller colonies on serum agar than the others, and it will not grow on grape sugar agar.

But it must not be forgotten that both bacilli may be present simultaneously in lesions resembling those of true blackleg.

It has been suggested that polyvalent filtrates are required for the protection of animals against this group of diseases.

Up to the present, however, little systematic work has been done regarding immunization against malignant oedema infections by means of filtrates. This subject has been taken up by the authors and they have used three different strains (vib. septique P., oedema bacillus 151, and oedema bacillus D.G.A.) in their experiments. Controls were carried out with a strain of blackquarter bacillus proved capable of producing an efficient filtrate.

The filtrates were made from cultures in liver broth after prolonged incubation, and were passed through Berkefeld filters. Their sterility was tested by sowing out quantities ranging from 1 to 5 cc. in liver-peptone-broth.

Guineapigs were injected subcutaneously on the abdomen with 0·5 to 5 cc. of filtrate, and two to three weeks later with a living 48-hour culture of the homologous strain.

The results of eighteen experiments of this nature are given in tabular form.

Fourteen of the guineapigs died with typical lesions.

It has been shown by NISHIURA that cultures of the blackquarter bacillus in liver broth when diluted 1:1,000 to 1:100,000 with sterile culture medium produce just as good an immunity in guineapigs as germ free filtrates. It appeared therefore to be of interest to ascertain whether similar results could be obtained with vibrion septique. The presence of viable organisms in the diluted cultures was proved by subcultivation.

Tabular statements show the results obtained in 17 experiments of this nature carried out with 2 different strains. The results were very irregular. Twelve guineapigs died. In some of these the disease followed a typical course. In others it was prolonged to several days. Three survived, and two died, without evidence of infection with the vibrion septique, after inoculation. The inference to be drawn is that both filtrate and diluted cultures are very uncertain means of inducing immunity in guineapigs against malignant oedema infections.

Biologically the vibrion septique is readily distinguished from the bacillus of blackquarter by this means.

KLARIN (E.). **Om kastning genom Spirillinfektion.** [Vibrionic Abortion.]—*Skandinav. Vet-Tidsk.* 1926. Ap. Vol. 16. No. 4. pp. 63–87.

The author summarizes the literature upon the subject, and records the occurrence of the disease in Sweden.

An account of the bacteriology of the disease is also given.

FUTAMURA (H.). **New Cases of Contagious Pustulous Dermititis in Swine.**—*Jl. Jap. Soc. Vet. Sci.* 1926. Mar. Vol. 5. No. 1. pp. 11–12.

From a skin lesion of pigs, which is characterized by the formation of pustules, the author has cultivated a streptococcus which he considers to be the cause.

BOURDENKO (N. N.) & GIVAGO (N. L.). **Traitement des inflammations suppurées par les filtrats d'après la méthode de Besredka.** [The Treatment of Suppurative Lesions by Besredka's Filtrate Method.] —*Ann. Inst. Pasteur.* 1926. March. Vol. 40. No. 3. pp. 232–241.

The authors find that the best filtrates are obtained in cases of staphylococcic infections when the cultures are incubated for 8 to 12 days. The sterility of the filtrate is ascertained and it is then re-inoculated with the original organism, and if no growth takes place in 24 hours the liquid is again filtered and used. If growth occurs incubation is continued for eight to ten days, and it is again filtered, and inoculated a third time with the original organism.

In laboratory experiments the following results were obtained:—

Two guineapigs were enveloped in compresses saturated with filtrate and two with compresses soaked simply in broth. The following day the dressings were removed and the four guineapigs along with two further untreated controls were inoculated subcutaneously with 2 cc. of staphylococcus culture. Only those treated with the filtrate compresses survived. The remainder were dead in 29 hours.

Four guineapigs were inoculated subcutaneously with a mixture of filtrate and culture (quantities not given). Two survived and two died. Two controls which received culture alone also died.

In a similar experiment in which the mixture of filtrate and culture was given intraperitoneally there were no survivors. Filtrate of staphylococcus culture yielded no protection against culture of streptococci, and vice versa.

Details are given of a number of suppurative conditions, chronic and acute, in human beings which have been treated with same success.

GRASSET (E.). **Sur la résistance du cobaye aux toxines additionées de tapioca et sur le rôle du tapioca.** [The Resistance offered by Guineapigs to Toxins mixed with Tapioca, and the Part played by Tapioca in the Reaction.]—*C.R. Soc. Biol.* 1926. Feb. 5. Vol. 94. No. 4. pp. 260–262.

To a dose of 2 cc. of diluted diphtheria toxin containing two lethal doses for a guineapig of 300 g. was added to some tapioca, so that only a part of the liquid was absorbed by it. This mixture was injected subcutaneously into a guineapig. The animal died with typical lesions, but there was a considerable delay as compared with a control guineapig.

With a quantity of tapioca sufficient to soak up the whole of the toxin dilution the only result was a local reaction which was characterized by oedema which was slowly reabsorbed. In some cases a little abscess developed at the seat of injection.

Repeating the experiment with increasing doses of toxin the author found that guineapigs could survive four or five lethal doses with only a slight loss of weight during the first few days. Some guineapigs

survived four or five injections, each representing three fatal doses, the injections being given immediately the reaction caused by the previous one had disappeared (about 10 days).

Practically parallel results were obtained with tetanus toxin.

In investigating the part played by the tapioca in this reaction, the author found that if the toxin-tapioca mixture is acted upon by an amylolytic ferment the toxicity of the mixture is restored. Apparently the tapioca does not act by allowing the absorbed toxin to act slowly and so gradually produce immunity, because guineapigs, which had been injected with the tapioca-toxin mixture, were found after this had been absorbed to possess no general immunity.

The author's explanation of the action of the tapioca is that it produces an inflammatory reaction and that the mobilized defences of the body deal with the traces of toxin as they are liberated from the tapioca.

DISEASES DUE TO FILTERABLE VIRUSES.

STOCKMAN (S.) & MINETT (F. C.). **Researches on the Virus of Foot-and-Mouth Disease.**— *Jl. Comp. Path. & Therap.* 1926. Mar. 31. Vol. 39. No. 1. pp. 1–30.

The present paper embodies the results obtained at the Laboratory of the Ministry of Agriculture between August, 1924, and October, 1925. There are not included any details of experiments carried on at the Pirbright Experimental Station with larger animals.

The work has been carried out with virus from nine sources. Six of these were outbreaks in Great Britain, and the remaining three were one isolated by GINS and FORTNER and obtained from the Lister Institute, and the O and A viruses of VALLÉE.

With the exception of one of the British viruses and the Virus A (VALLÉE) all could be used for the infection of guineapigs. The exceptional British virus appeared to be a very feeble virus for the guineapig, and died out after a few passages. The Virus A was only induced to infect guineapigs with difficulty, and success was only achieved when fresh epithelium from an experimentally-infected calf was used.

In fixing the filtration technique to be followed the most satisfactory results were obtained with Seitz filters, although these failed to arrest bacteria on one or two occasions.

In a single experiment a collodion filter was found to arrest the virus. The lymph was generally diluted with 50 or 100 volumes of saline before filtration.

Experimental tests indicated that epithelial cells washed free from adhering lymph are more virulent than the lymph, as tested by the amount of dilution required to render the materials avirulent.

Attempts to concentrate the virus by centrifuging failed on the whole, but it is considered that centrifuging possibly causes some alteration in the density of the virus.

No evidence of adsorption of the virus by red corpuscles or by dead bacteria could be obtained and consequently this method of attempting concentration failed.

In experiments with Kieselguhr as the adsorbing agent there was evidence to suggest that the virus was adsorbed to some extent, but the adsorption was a loose one.

No evidence was obtained of the existence of an antibody in the lymph as postulated by DAHMEN and FROSCH.

No success was achieved in attempts to cultivate the virus, but it was noted that the virus will survive for several weeks at 34° C.

Investigations were carried out regarding the favourable or unfavourable effects of certain external circumstances upon the survival of the virus at 30° C.

The pH of the suspending liquid was found to be of the utmost importance, and tests carried out showed that the optimum is 7·5 or 7·6.

Variation in the oxygen pressure appeared to exercise no influence upon the survival of the virus. Similarly, colloidal substances which have been used for protection of fragile organisms against the harmful effects of sodium and other ions, failed to increase the period of survival.

In spite of numerous attempts by various means to separate the hypothetical antibody referred to by DAHMEN from the vesicle lymph, no evidence was obtained that the rapid death of the virus is due to the action of any such body. Phosphate mixtures, glycerin, leucocyte extract, *B. coli* extract, sterile raw potato, sterile unheated kidney tissue were all tried with a view to finding which would favour the survival of the virus. Glycerin, sterile animal tissue, and phosphates appeared to favour survival. The work lends support to the view that the virus finds the materials necessary for its growth only within the cell protoplasm.

The duration of survival of the virus varies greatly with the temperature at which it is kept. The lower the temperature the more prolonged the survival. It was also found that the virus was resistant to repeated freezing and thawing, a process generally destructive to bacteria. Glycerin is almost universally used as a preservative for the filterable viruses, and the virus of foot-and-mouth disease is very resistant to the action of glycerin in 50 per cent. dilution. Pure glycerin is more destructive to it.

The resistant of the virus to chloroform is very great. In one case the virus was not destroyed when chloroform vapour was bubbled through it for 36 hours. The results with ether were somewhat similar. Antiformin and formalin are rapidly destructive to the virus.

The authors confirm in general the results obtained by others in the inoculation of guineapigs.

Intradermal inoculation leads to the development of primary lesions with generalization 24 hours later. It is noted that if the primary vesicles are slow in developing generalized lesions do not as a rule appear. The virus does not tend to persist in the internal organs as these have yielded negative inoculation results on the third day. Similarly, the primary lesions soon lose virulence, and material taken from them on the fifth day may be non-infective.

Guineapigs may be infected by intravenous, intramuscular and intraperitoneal inoculation, but of these the first is somewhat unreliable. Scarification is a certain means whether the part selected is covered with hair or not, but rubbing the virus into sound skin does not infect. The disease is slower of development in the guineapig when first inoculated from cattle than subsequently after a few passages.

The disease shows no tendency to spread naturally among guineapigs by simple contact.

While guineapigs are generally very sensitive to virus adapted to them it must not be forgotten that refractory individuals may be encountered.

Attempts to produce infection in fowls, ducks, martins and sparrows have failed, but the virus may be detected at the site of intradermal inoculation after a lapse of five days.

Up to the present sufficient evidence regarding the possibility of the existence of different strains of virus has not been accumulated to allow of any statement as to their existence or otherwise.

VAN SACEGHEM (René). **La fièvre aphteuse dans l'est Africain Belge.** [Foot-and-Mouth Disease in Belgian East Africa.]—*Ann. Soc. Belge. Méd. Trop.* 1926. Jan. Vol. 5. No. 2. pp. 209–214.

In September, 1924, foot-and-mouth disease broke out in Ruanda. The source of the outbreak was not discovered. The actual deaths among adult cattle were few, but a not inconsiderable number of calves died, and numerous cases of abortion occurred. The author observed a few cases of mastitis, in which the milk was tinged with blood. Pigs are as susceptible as cattle to infection. A number of cases were observed in pigs in which the lesions were limited to the feet, with shedding of the claws. There was a mortality of 50 per cent. among the young pigs.

The author draws special attention to the fact that animals that had recovered from cattle plague became affected with foot-and-mouth disease, because he states that this is proof that the two diseases are distinct, and that cattle plague is not a specially severe form of foot-and-mouth disease as has been held by some. [No names are given.—Ed.] He states that using the ultramicroscope he has been able to see in the blood of animals affected with foot-and-mouth disease large numbers of minute bodies showing brownian movements. The author states that as the virus of the disease is dermatotropic the ectoderm is the seat of election for vaccination, and that if one could vaccinate the skin against the virus there would be no further risk of infection.

He has devised a method by means of which he has attempted vaccination. The technique is as follows: Instead of fixing the virus on the blood corpuscles of recovered bovines, which, depending upon the degree of immunity possessed by the animal, more or less neutralize the virus, he has fixed the virus on the blood corpuscles of insusceptible animals, e.g., the dog, man, and the fowl. The virus so fixed has been inocuated intradermally into cattle.

The fixation was achieved by mixing foot-and-mouth disease lymph with 5 volumes of dog blood corpuscles obtained by centrifuging citrated blood. Unaffected animals from a herd in which the disease existed were inoculated intradermally into the skin of the lower lip. All the animals showed a swelling as large as a pigeon's egg at the seat of inoculation a week later, and in several of them there was a true vesicular lesion. Complete recovery took place without further extension, and when these animals were returned to the infected herd none became infected [no numbers of animals treated are given].

The author does not advise inoculation into the lip, however, as this tissue is very susceptible to the virus, and further it would be difficult to carry out the inoculation without infecting the animal by way of the alimentary tract. The virus was fixed to human or fowl corpuscles in the same way, but in this case the skin of the scrotum was selected as the seat of operation.

Thirty animals from an uninfected herd were so treated. There was a slight local reaction. A fortnight later the animals were mixed

with an infected herd. None of them developed the disease. It is said that two months later the animals were still resistant, but circumstances beyond his control prevented the author from ascertaining the full duration of the immunity.

WINKEL (A. J.). **Mond- en Klauwzeeronderzoek.** [Foot-and-Mouth Disease Investigations.]—*Tijdschr. v. Diergeensk.* 1926. June 1. Vol. 53. No. 11. pp. 489–501.

Waldemann's method of serum testing may furnish valuable information regarding the protective properties of the blood or serum of a recovered animal. Although it is established that recovered animals or animals that are actually recovering may furnish serum which is of value for the protection of young calves and pigs, similar results are not to be expected in adult animals.

The amount of antibody present in such sera is very variable, and they cannot, therefore, be used in regular practice for the control of the disease.

On the other hand, a properly prepared hyperimmune serum is at least three times as effective as a convalescent serum.

In addition, the exact value of a hyperimmune serum can be fixed.

The part that may be played by such an immune serum in the control of the disease is a subject for further research.

SCHMID (F.). **Die Lebenfähigkeit des Maul- und Klauenseuchevirus in Äther.** [The Vitality of the Virus of Foot-and-Mouth Disease in Ether.]—*Deut. Tierärzt. Woch.* 1926. June 12. Vol. 34. No. 24. pp. 443–444.

The virus of foot-and-mouth disease is not certainly destroyed by exposure to ether for a period of 54 days or even more, but prolonged exposure tends to weaken it. This is shown by the localized lesions resulting from the injection of virus exposed for 12 to 16 days.

It is stated that a valuable degree of immunity may be established by intra-abdominal inoculation with virus treated with ether for periods ranging from 18 to 28 days.

WALKER (G. K.) & TAYLOR (W.). **Foot-and-Mouth Disease—Control by Chemotherapy.**—*Vet. Bull.* No. 17. Dept. Agric. Punjab.

In starting the experiments detailed in this Bulletin the authors experienced difficulty in obtaining a virus of sufficient virulence. A virus obtained from England was found to be readily transmissible to guineapigs, but it failed to infect cattle.

Eventually, however, a strain of high virulence was obtained from BRANFORD at the Government Cattle Farm, Hissar.

In the course of the experiments it was found that vesicular lesions develop in 8 to 24 hours after the thermal reaction which marks infection has occurred.

In each experiment weaned calves were used, and for each treated experimentally a control was kept. It is to be remarked that in three cases the control calves developed a second crop of vesicles within a day or two after the original vesicles had healed. At first hill cattle were used, as these were thought to be more susceptible, but later it

was found that plains cattle were equally susceptible. The treatment resorted to was the intravenous injection of a solution of iodine having the following composition :—

Iodine	1 g.
Potassium iodide	2 g.
Distilled water	300 cc.

By experiment it was found that doses of over 100 cc. were not always tolerated, and that doses of 50 to 100 cc. were capable of yielding good results.

Some 17 of the 22 pages which go to make up this Bulletin are given over to a tabular statement of the experimental details of 11 pairs of calves.

The injection of iodine was made when the temperature rose, following the inoculation with virus.

With one exception none of the injected animals developed lesions of the disease.

With a view to ascertaining whether the temperature reaction had conferred any degree of immunity all the treated animals were exposed to natural infection and, in addition, were inoculated intravenously with virulent blood at intervals ranging from 1 to 24 days after the injection of iodine. In no case did any lesions develop. The virus used was controlled.

With the object of ascertaining the effect of an injection of iodine prior to the inoculation with virus four calves were given 50 cc. of the solution and virulent blood after the lapse of 24, 48, 72 and 96 hours.

Symptoms of the disease developed in all, but the periods of incubation were inversely proportional to the intervals elapsing between dosing and inoculation. In the animal inoculated one day after treatment the period of incubation was 12 days, and in that inoculated four days after the injection of iodine the period of incubation was four days. In each instance the disease ran a normal course. From the experiments it appears that a sufficient dose of iodine injected intravenously prior to the development of lesions will cut short the course of the disease and prevent the formation of vesicles. Some degree of immunity is conferred in this way, but it is not yet known to what degree this immunity develops.

It seems to be probable that the period of infectivity of cattle treated in this way must be short since it appears to be fair to assume that in the absence of lesions the chance of transmission of the disease to other animals must be very small.

As the effect of an injection of iodine prior to inoculation was tested in one experiment only, judgment of the result must be suspended for the time being.

In one instance in which vesicle formation had begun before treatment was resorted to the injection appeared to exercise a favourable effect upon the course of the disease as compared with that in the corresponding control.

It is suggested that in outbreaks of the disease injections of iodine should be given to all animals showing a rise of temperature. If it is impracticable to take temperatures all in-contacts should be injected, but it is admitted that in this case no appreciable immunity would be conferred upon those not actually infected at the time. But the method might be used pending the introduction of the taking of all temperatures twice daily.

Another procedure worthy of consideration is the inoculation of all in-contacts with virulent blood and the injection of iodine when the temperature rises.

A further point requiring investigation is the possibility of reinforcing immunity by inoculation with virulent blood while the animals are still immune as the result of iodine treatment of a primary attack.

An important point noted in the course of the experiments is that there is little or no loss of condition in treated animals.

VALLÉE (H.), CARRÉ (H.) & RINJARD (P.). **Sur l'immunisation anti-aphteuse par le virus formolé.** [Immunization against Foot-and-Mouth Disease by means of Formolized Virus.]—*Rev. Gén. Méd. Vét.* 1926. Mar. 15. Vol. 35. No. 411. pp. 129–134.

As virus the authors use fragments of epithelium exfoliated from lesions, but they have used fragments taken from unruptured lesions or from lesions which have burst only a few hours previously.

These may be kept either dry in cold store at 0° C. or placed in a mixture of equal parts of glycerine and salt solution.

The fragments are weighed, finely divided with scissors, and very thoroughly ground in a mortar with a small quantity of salt solution and sand. When trituration has been completed a very small quantity of salt solution is added and the mixture is strained through fine muslin. Further salt solution is added, through the straining cloth, so that finally there is 10 cc. for every 30 centigrammes of epithelium.

Finally, 25 per cent. solution of commercial formalin is added in the proportion of 0·2 cc. per 10 cc. The mixture is thoroughly shaken and kept in the dark for at least 48 hours.

The virulence of the material is tested by guineapig inoculation prior to the addition of the formalin, and its sterility is tested in a similar manner 48 hours after the formolized vaccine has been prepared.

Two heifers were inoculated with vaccine prepared from virus O in a dose of 10 cc., the inoculation being carried out behind the shoulder. There was no reaction of any kind.

A month later these animals along with a control were each inoculated with 10 cc. of virulent blood (virus O). The control developed infection in 50 hours, while the vaccinated animals failed to become infected. The whole process was repeated with vaccine prepared from virus A, and this virus was used for immunity test. Five heifers were vaccinated, and two were used as controls.

These were tested with virulent blood. The controls reacted, but the vaccinated animals resisted infection. The vaccinated animals were then retested with materials taken from mouth lesions of the controls. No infection occurred.

A bivalent vaccine was prepared by the technique described from both viruses (A and O).

Six heifers were inoculated subcutaneously with 20 cc. of this and four intracutaneously with 2 cc. There were no reactions. Twenty-six days later three of these vaccinated subcutaneously and two vaccinated intradermally were tested with O virus along with one control.

The control, the animals inoculated intradermally, and one of those treated subcutaneously became infected. The two remaining animals failed to react to test inoculations. Thirty-four days later the remaining animals were tested with O virus together with a control. The control, and one animal vaccinated intradermally reacted. The remainder resisted inoculation and also aphthization.

Forty-eight days after vaccination the whole groups was tested by inoculation with 10 cc. of virulent blood (virus A), together with the control which resisted virus O. The latter animal became infected, the six vaccinated heifers resisted infection.

WALDMANN. **Richtlinien zur Simultan- und Heilimpfung gegen Maul- und Klauenseuche.** [Indications regarding Simultaneous and Curative Inoculations against Foot-and-Mouth Disease.]—*Berlin. Tierärzt. Woch.* 1926. Jan. 22. Vol. 42. No. 4. pp. 53–55.

This is a brief account of methods of dealing with foot-and-mouth disease by inoculation methods for the guidance of practitioners.

PLANTUREUX (Edmond). **Contribution à l'étude du traitement préventif de la rage chez les animaux.** [The Protective Inoculation of Animals against Rabies.]—*Ann. Inst. Pasteur.* 1926. Feb. Vol. 40. No. 2. pp. 141–151.

The author points out that while in other countries protective and curative treatments are carried out on dogs, the law of France compels the slaughter of all dogs bitten. On the other hand, there is nothing against the retention of herbivora. Since the war the cost of cattle in France has gone up enormously, and there is every incentive to attempt to save animals bitten by rabid dogs. Any vaccine used for the purpose must fulfill certain conditions. It must be reasonably cheap, must require only a few injections, it must be capable of being used at a distance from laboratories, and must be simple to apply.

The methods hitherto devised are open to one or more of these objections.

Since PASTEUR showed that a whole series of injections of spinal cord could be given to dogs without danger within 48 hours, and HÖGYES found that six injections of dilutions ranging from 1 in 5,000 to 1 in 10 could be given at intervals of two hours, the author argued that it should be possible to achieve immunization if the spinal cord emulsion were introduced in a fatty excipient for the purpose of delaying absorption.

His first experiments were carried out with a vaccine prepared by mixing 1 part of fixed virus brain intimately with 2 parts of lanoline and adding, with constant stirring, 7 parts of sterile olive oil.

Abscess formation proved an objection to the use of this vaccine.

In subsequent experiments the oil was replaced by a 33 per cent. solution of dextrin. Suspensions in this medium rapidly lost virulence, but it was found possible to immunize rabbits solidly with a single injection of 10 cc. The vaccine contained 1 part of rabbit brain to 19 parts of carbolized dextrin solution.

In an experiment in which eight rabbits were treated after infection only two failed to contract the disease. Seven dogs were given two doses of 8 to 12 cc., according to their size, at an interval of two days. When tested by corneal scarification three months later all survived, while one of two controls contracted rabies on the twenty-third day.

Five dogs were treated after infection with doses of 4, 6, 8, 10 and 12 cc., which were repeated after two days. Three were kept as controls. Two of the latter developed the disease in 19 and 21 days, and the third, which was old and blind, died on the 26th day, but not, apparently, from rabies.

One of the treated dogs contracted rabies on the 37th day.

The remaining four were tested by inoculation four months later and all contracted rabies.

Two goats and two sheep were given two doses (of 10 and 20 cc.) of vaccine each with an interval of two days. They were tested after an interval of four months by inoculation into the anterior chamber of the eye with street virus and all resisted infection. Two control dogs contracted rabies in 12 and 14 days.

The preparation of the emulsion requires special skill and could not be carried out by a practitioner. The difficulty of dispensing the vaccine for use in the field may be overcome by keeping the fixed virus in carbolized serum and mixing this with the dextrin solution at the moment of injection.

Six goats were treated with vaccine 48 hours after inoculation intramuscularly with street virus. All survived. Of three untreated controls two developed rabies. With a view to further simplification of the preparation of the vaccine the author has tested the following technique: The rabbit brain containing the fixed virus is mashed up in 19 parts of a liquid having the following composition: Normal salt solution 400, carbolic acid 1, normal horse serum 200. The emulsion is filtered through sterile gauze.

For vaccination the first vaccine is a dilution of 1 in 1,000, the second 1 in 150, and the third the original emulsion.

The first and second vaccines are given on consecutive days, and the third after an interval of one day.

In experiments with rabbits using 5 cc. doses, and with dogs using 10 cc. doses immunity was established, and was shown by the animals resisting inoculation with fixed virus.

PLANTUREUX (Edm.). **Pouvoir infectant du virus rabique fixe d'Alger inoculé dans la chambre antérieure de l'oeil et le tissu conjonctif sous-cutané de divers animaux.** [The Infectivity of the Algerian Fixed Virus of Rabies by Intra-ocular Inoculation.]—*C.R. Soc. Biol.* 1926. Feb. 5. Vol. 94. No. 4. pp. 247–249.

With repeated passage fixed virus becomes more and more differentiated from street virus. Its virulence for nerve tissue becomes increased while it loses virulence for other tissuse.

It has been stated by PUNTONI that the virus used in Rome (1,850th passage) is only virulent by subdural and intracerebral inoculation.

Experiments carried out at the Pasteur Institute at Algiers indicate that the virus used there (1,500th passage) has not lost any of its virulence when injected into the anterior chamber of the eye. Rabbits, dogs, goats, and sheep were used in the test.

In tests by the subcutaneous path 6 out of 8 rabbits became infected. Dogs, however, resist subcutaneous inoculation, and three out of four tested in this way were found to be immune to intra-ocular inoculation a month later.

In certain laboratories the view was held that the fixed virus was harmless for man and some animals by subcutaneous inoculation, and it was suggested that fully virulent cords should be used for protective inoculation by this path. As a result of accidents this method of vaccinating has been discontinued.

It appears to be not impossible that in certain circumstances fixed virus may recover a part of its virulence.

Three dogs were inoculated intramuscularly with 5 cc. of a 1 in 25 emulsion of street virus. Three days later two of them were given 10 cc. of a 10 per cent. emulsion of fixed virus subcutaneously. These developed rabies in three weeks and died within 48 hours. The brain of one of these was used for the inoculation of rabbits, which developed symptoms of rabies on the 6th day—the period of incubation of the fixed virus.

The third dog was a control, and survived.

SCHERN (K.). **Ueber Tollwutimmunisierung und die Notwendigkeit der obligatorischen Impfung aller im Verkehrsleben befindlichen Hunde.** [The Necessity for Compulsory Immunization of Dogs.]—*Seuchenbekämpfung.* 1926. Vol. 3. No. 1. pp. 46–50.

The author has not observed any disturbance of health in any of the dogs injected with a single immunizing dose of fixed virus, nor has he encountered any dog so immunized that was a virus carrier.

The method may be employed after a dog has been bitten by a rabid dog, provided the interval does not exceed 14 days.

REMLINGER (P.). **Au sujet de la vaccination contre la rage. Procédés rapides d'inoculation des lapins de passage.** [The Rapid Inoculation of "Passage" Rabbits with the Virus of Rabies.]—*Ann. Inst. Pasteur.* 1926. Feb. Vol. 40. No. 2. pp. 167–168.

The author suggests that the trephine can be done away with in connection with this operation. A drawing pin or a tin-tack may be used for perforating the cranium.

MALFROY (M. F.). **La peste bovine en Afrique Occidental Française.** [Rinderpest in French West Africa.]—*Bull. Comité d'Etudes Hist. et. Scientif. de l'Afrique Occidental Française.* 1925. July–Sept. Vol. 8. No. 3. pp. 439–496. With one map.

In this paper the author gives an account of the history of rinderpest in French West Africa, and traces the spread of the disease into the territories from areas further east.

He pleads for an efficient veterinary service to check its spread into the French possessions.

MIESSNER (H.) & BERGE (R.). **Die Geflügenpest bei Gänsen.** [Fowl Plague in Geese.]—*Deut. Tierärzt. Woch.* 1926. May 22. Vol. 34. No. 21. pp. 385–393.

The author reports the occurrence of what appears to have been true fowl plague in two consignments of geese despatched from Northern Italy. Of the first batch of 210, 81 died, and of the second of 96, 40 died.

The paper gives an account of the clinical and bacteriological investigations, and contains a number of illustrations showing the most typical symptoms.

The principal symptoms were of a nervous type, and presented themselves as varying degrees of paralysis and incoordinated movements. There was also a mucous discharge from the nares, and diarrhoea.

At the post-mortem ecchymoses were found on all the mucous membranes. It was not found possible to transmit the disease by inoculation to young geese, but it was readily transmitted to fowls with production of the same symptoms, and similarly it could be carried on from fowl to fowl.

It was found possible to infect geese with virus that had been passed through fowls; it therefore appears probable that the virus was attenuated to some extent by passage through the goose, and that its virulence was restored by passage through the fowl.

The filtrability of the virus was established in passage experiments with fowls. Simple contact and feeding with contaminated foodstuffs failed to set up the disease.

Attempts to infect ducks with passage virus failed.

TEPPAZ (L.). **Contribution à l'étude de la Horse-Sickness au Sénégal.** [Horse-Sickness in Senegal.]—*Rec. Méd. Vét.* 1926. Mar. 30. Vol. 102. No. 6. pp. 128–129.

This note is a report by BROCQ-ROUSSEU on a paper submitted by Teppaz for the Doctorate.

LUSENA (M.). **Studi sull' epitelioma contagioso aviario.** [Epithelioma contagiosum of Birds.]—*Sperimentale.* 1926. Jan. Vol. 79. No. 6. pp. 969–1002. With 2 plates.

PAILLOT (A.). **Contribution à l'étude des maladies à virus filtrant chez les insectes. Un nouveau groupe de parasites ultramicrobiens : *Les Borrellina.*** [Diseases of Insects caused by a New Group of Filterable Viruses. Borrellina.]—*Ann. Inst. Pasteur.* 1926. Apr. Vol. 40. No. 4. pp. 314–352.

MYCOTIC DISEASES.

ARROYO Y MARTIN (C.). **Contribución al estudio de la linfangitis epizootica.** [Epizootic Lymphangitis.]—*Revista Zootécnica.* Buenos Aires. 1925. Nov. 15. Vol. 12. No. 146. pp. 333–343.

This contribution gives an excellent account of epizootic lymphangitis showing how the condition arises in wounds which have been neglected, or which have not been energetically treated. Experimental infection is difficult to bring about, either by subcutaneous inoculation of pus, or cutaneously after scarification, or even after repeated inoculation intravenously of as much as 1 cc. of pure culture of the cryptococcus. Horses which have been debilitated from some other condition, for example, the Pasteurelloses, are particularly susceptible, and in them the course and evolution are rapid. The incubation period seems to vary considerably, between one and four months. VELU, a French veterinarian, described two forms: the ordinary type, as described in the text-books, and an atypical form characterized by indolent, painful wounds, without the typical nodes and ulcers. Infection of mucous membranes is uncommon, occurring only in 1–2 per cent. of cases.

The subjects do not give the mallein reaction, unless, as occasionally occurs, true glanders is also present. A table of distinctive points between the two diseases is given of which the chief are: In glanders the pus is oily and ropy, the edges of the ulcers are hard and indurated, with characteristic lymphatic ramifications; the lymphangitis is not limited to one set of vessels, and there is constitutional upset, with fever. In epizootic lymphangitis, on the other hand, the pus is never oily, but serous or creamy, and of a yellowish colour; the lymphangitis is usually limited to one system; there is little if any constitutional disturbance and, as a rule, no rise of temperature. Lastly, microscopical examination will suffice to differentiate the two. The best treatment is excision, or, failing this, if the condition is extensive, cautery. It may be necessary, if the ulcer is deep and fungoid, to precede the cauterization by scraping. The use of arsenicals, as salvarsan and cacodylate of sodium, or of potassium iodide, is not recommended. Prophylaxis is summed up in isolation of cases, early segregation of suspects and contacts, and adequate treatment of wounds, disinfecting of stalls, and cleanliness generally.*

EBERBECK (Erich). **Ätiologisch-biologische und pathologisch-histologische Untersuchungen über die Lymphangitis epizootica des Pferdes.** [The Etiology and Pathological Histology of Epizootic Lymphangitis.]—*Arch. f. Wissenschaft. u. prakt. Tierheilk.* 1926. Mar. 6. Vol. 54. No. 1. pp. 1–31.

The author found that Loeffler's blood-serum medium prepared with horse serum was a good one for growing two strains of the organism which had been maintained on glycerin-grapesugar agar for about 6 years. Growth took place at 22° C., but none at 37° C.

It was found possible to get a growth on pure liquid blood serum when a cork raft was used for floating the seed material.

The author thinks that the organism develops free spore cases containing four typical spores and that therefore it should be named *Endomyces farciminosus*. The strains grown on the sugar agar medium had almost entirely lost their virulence for the horse, but this was recovered when the cultures were grown upon the horse serum.

In experimental inoculations with cultures the author has found that an immunity may be established in about half the time recorded by BOQUET & NÈGRE, namely, in about four weeks.

It was not found possible to infect a horse by friction with virulent culture into a shaved area of skin. Subcutaneous inoculation produces an abscess, but the greater part of the culture injected disappears within 24 hours, and the leucocytes are found to be moderately laden with the organism.

BARDELLI (P. C.). **Ricerche sulla linfangite criptococcica. Nota IV. Antigenoterapia specifica della linfangite criptococcica.** [Antigenotherapy in Cryptococcic Lymphangitis.]—*Nuova Veterinaria.* 1925. Mar. 15. p. 9. Ex. *Bull. Inst. Pasteur.* 1926. Feb. Vol. 24. No. 3. pp. 125–126.

The author finds that heated cultures are of undoubted value for the treatment of epizootic lymphangitis.

* Summarized by Dr. H. Harold Scott.

BARDELLI (P. C.). **E'possibile vaccinare preventivamente contro la linfangite criptococcica?** [Is it Possible to protect Animals against Cryptococcic Lymphangitis by Inoculation?]—*Ann. d'Igiene.* 1926. Jan. Vol. 36. No. 1. pp. 36–38.

Two horses were given injections, one of " crude antigen " derived from the cryptococcus in doses of ·005, ·01, and ·02 g. at intervals of 10 days and the other of a similar antigen prepared from Monilia macroglossae. Thirty days later both horses were injected subcutaneously with culture of the cryptococcus of Rivolta, and the injections were twice repeated at intervals of a fortnight.

The first horse failed to become infected, and the second developed the disease after an incubation period of a month.

BARDELLI (P. C.). **Ricerche sulla linfangite criptococcica. Coltivazione in serie del Criptococco di Rivolta.** [The Cultivation of the Cryptococcus of Rivolta.]—*Ann. d'Igiene.* 1924. Nov. Vol. 34. p. 796. Ex. *Bull. Inst. Pasteur.* 1926. Feb. Vol. 24. No. 3. p. 125.

Using Sabouraud's agar containing 2 per cent. peptone and 5 per cent. glucose with the addition of a maceration of calf thymus the author has obtained cultures in only 1·8 per cent. of cases with pus as seed material.

GALLEGO (A.). **Contribución al estudio de las blastomicosis. Algunas observaciones sobre la histopatologia de la linfangitis epizoótica.** [Blastomycosis. The Morbid Anatomy of Epizootic Lymphangitis.]—*Revist. Hyg. y Sanidad Pecuarias.* 1926. Mar. Vol. 16. No. 3. pp. 141–147.

The author points out that clinically epizootic lymphangitis may be confounded with farcy, but that there are ample means available for arriving at a definite diagnosis. He appears to believe, however, that histological examination of lesions is superior to microscopic examination directed towards the detection of the causal organism of lymphangitis.

MISCELLANEOUS.

BOHN (Hans). **Die Behandlung der Gehirn-Rückenmarksentzündungen des Pferdes mit Urotropin.** [The Treatment of Cerebral and Spinal Meningitis in Horses with Urotropin.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1926. Apr. Vol. 54. No. 2. pp. 141.

The author has treated one case of the so-called Borna disease, three of infectious meningitis, one each of infectious cerebro-spinal meningitis and of inflammation of the spinal cord, and twelve of non-infectious acute inflammation of the brain.

He concludes that the number of cases is not sufficient to warrant any conclusion.

Single doses up to 50 g. may be injected.

EDELMANN. **Zur Bekämpfung der Gehirnrückenmarkentzündung (Bornaische Krankheit) der Pferde.** [The Control of Borna Disease.]—*Deut. Tierärzt. Woch.* 1926. Mar. 6. Vol. 34. No. 10. pp. 167–169.

This paper is a review of the history of the disease and an account of the regulations issued from time to time for its control.

LE COULTRE (A. P.). **De Balische Ziekte.** [Bali Disease.]—*Nederl.-Ind. Blad. v. Diergeneesk. en Dierent.* 1926. Feb. Vol. 38. No. 1. pp. 73–91. With 1 plate.

The author gives an English summary of his paper.

The disease is sporadic and, in the case seen by the author, the following symptoms were presented. Marked anaemia accompanied by rapid emaciation, slight yellow discolouration of the serous and mucous membranes. There was lachrymation and nasal discharge. Superficial ulcers were present at the margins of the nostrils, on the under side of the tongue, and in the vagina. At parts of the body the superficial layers of the skin become leathery and hairless and later these are shed, exposing the corium. At the post-mortem only slight degeneration of the heart muscle and liver and ulceration of the bladder were found. Nothing is known regarding the cause.

EDWARDS (J. T.). **Some Recent Advances in the Protection of Cattle and other Animals against Disease. I.**—*Agric. Jl. India.* 1925. July. Vol. 20. No. 4. pp. 252–269.

——. **II. Some Points of General Importance in the Hygienic Maintenance of the Domesticated Animals.**—*Ibid.* Sept. No. 5. pp. 367–369.

——. **III. Rinderpest.**—*Ibid.* No. 6. pp. 429–443.

——. **IV. Johne's Disease.**—*Ibid.* 1926. Jan. Vol. 21. No. 1. pp. 6–13.

These contributions are intended to be educative to cattle owners in India and do not contain any reference to new research, save that in the third publication the author states that " much work has been done upon its (the virus) nature, and researches have been carried out upon a large scale in this direction at Muktesar during the last three years. It would appear to be an extremely minute fragile organism of the spirillary class to which the property of producing violent disease in cattle seems to be one readily lost when its propagation takes place elsewhere than in the animal body."

RABAGLIATI (D. S.). **Notes on a Few Bovine Diseases dealt with by the Egyptian Veterinary Service.**—*Vet. Jl.* 1926. May. Vol. 82. No. 5. pp. 248–255.

The nature of this brief paper is indicated by the author in his concluding paragraph : " It is hoped that the above rough sketch of the ailments to which cattle are liable in Egypt may prove of interest to the casual reader, but by anyone requiring further information, reference must be made to the published reports which used to be issued annually by the Director of the Veterinary Service, Cairo . ."

CREW (F. A. E.). **A Note on a Sexually Abnormal Camel.**—*Vet. Jl.* 1926. June. Vol. 82. No. 6. p. 311.

This brief note is illustrated by a photograph of the abnormality. No details are available other than those shown by the photograph.

" It may be assumed with a considerable degree of confidence that in this case there were well mal-descended testicles, and fairly well developed derivatives of both Müllerian and Wolffian ducts."

The note is published in the hope that it may sufficiently interest veterinary surgeons who have to do with camels, so that they may, whenever possible, enquire completely into the nature of such an abnormal individual.

JALABERT (M.). **Au sujet de la Toxicité de la Férule.** [The Toxicity of Ferula.]—*Rev. Vét.* 1926. May. Vol. 78. No. 5. pp. 276–281.

The author summarizes the various views that have been expressed regarding the toxicity of ferula, but concludes that his own experiments carried out with rabbits leave no doubt that the plant is poisonous.

There remain for examination points regarding the toxicity of different parts of the plant, and the possible seasonal variation in toxicity.

VELU (H.) & JALABERT (H.). **Toxicité des jus de férule pour le lapin et le porc.** [The Toxicity of the Juice of Ferula (Giant Fennel) for the Rabbit and the Pig.]—*Bull. Soc. Path. Exot.* 1926. Jan. Vol. 19. No. 1. pp. 22–25. With 1 text fig.

As a result of their experiments the authors feel justified in concluding that the juice expressed from leaves collected immediately after the rains, when *Ferula communis* and *Mandragora officinalis* constitute the only vegetation, is poisonous for rabbits and pigs.

The symptoms and lesions presented by experimental animals are absolutely identical with those recorded by CHAPINS and BALOZET in natural cases.

HADLEY (F. B.). **Sweet Clover Poisoning of Cattle.**—*Vet. Med.* 1926. May. Vol. 21. No. 5. pp. 213–214.

MALFROY (M.). **L'elevage du mouton à laine au Soudan et la bergerie administrative.** [The Raising of Wool Breeds of Sheep in the Soudan.]—*Rec. Méd. Vét.* 1926. Apr. 30. Vol. 102. No. 8. pp. 178–182.

PAMMEI (L. H.). **Some Poisonous Plants of California.**—*Vet. Med.* 1926. May. Vol. 21. No. 5. pp. 220–223.

RETTERER (Ed.). **Structure de la défense d'éléphant.** [The Structure of the Elephant's Tusk.]—*C. R. Soc. Biol.* 1926. Feb. Vol. 94. No. 4. pp. 255–259.

SCHERN. **Die amtliche Prufung der Zeckenvertilgungsmittel in Uruguay.** [Official Tests of Dips in Uruguay.]—*Berlin. Tierärzt. Woch.* 1926. Mar. 12. Vol. 42. No. 11. pp. 170–171.

REPORTS.

SUDAN GOVERNMENT. **Report of the Veterinary Research Officer, Sudan Government, for the period October 1st, 1924, to September 30th, 1925.** [KNOWLES (R. H.).]—*Ann. Report of the Vet. Dept. Sudan Govt. 1925.* Appendix I. pp. 24–47. [Printed report, 8vo.]

It has been found that a single dose of 10 g. of " Bayer 205 " administered intravenously is the minimum required to effect a cure of camel trypanosomiasis. Sufficient for 800 doses is being purchased for an extended trial.

Experiments are under way in which tartar emetic is being tried in conjunction with " Bayer 205 " with a view to reducing the cost.

A preliminary test appears to indicate that while camels cured with " Bayer 205 " are susceptible to re-infection, they offer a greater resistance than untreated camels, and, developing a chronic form of infection, remain in good condition. From the results obtained in a considerable number of tests it appears that the percentage error in the formol-gel test is about 8 in the direction of incriminating healthy animals.

Three cases of *T. congolense* infection and two of *T. vivax* infection were detected in cattle. Knowledge regarding the incidence of these diseases is deficient. Two cases of trypanosomiasis in horses due to *T. pecaudi* were diagnosed in horses. One was treated with 2 doses of " Bayer 205," 3 grammes and 2 grammes, with a nine days' interval. The fact that the horse is fit and well eight months after treatment indicates a cure.

It has been found possible to prepare an anti-rinderpest serum which is efficient at a dose of 6·6 cc. per 100 lb. bodyweight.

A vaccine is being prepared from artificial cultures against contagious pleuro-pneumonia. The inoculation produces only a slight reaction, but confers a solid immunity. The medium used for the cultivation of the virus is a mixture in equal parts of Martin's broth and meal infusion with 10 per cent. of serum added. The reaction is adjusted to pH 8·0.

Contrary to what has been stated elsewhere, it appears that under continued cultivation there is a progressive loss of virulence, and that the virulence does not tend to become fixed after a certain amount of attenuation has occurred.

The programme for further investigation includes the following :—

1. Estimation of the relation between virulence of the vaccine and its antigenic properties.
2. The possibility of using non-virulent strains in larger doses, and the use of a single vaccine to replace the double vaccine.
3. The duration of the immunity conferred by the different methods.

BOOK REVIEWS.

BAYLIS (H. A.) [M.A., D.Sc., Brit. Museum (Nat. History)] & DAUBNEY (R.) [M.Sc., M.R.C.V.S., Vet. Res. Laboratory, Kabete, Kenya Colony.] **A Synopsis of the Families and Genera of Nematoda.**—pp. xxxvi+277. 1926. London: Printed by Order of the Trustees of the British Museum. [Price 10s. 6d.]

Recent years have seen enormous advances in the ancillary medical sciences—and none has advanced more rapidly than Helminthology. New

species have been described, new facts have been added to our knowledge of the biology of these parasites and a widely scattered literature has accumulated on the subject. For this reason we welcome this synopsis of genera and families of Roundworms as one of the primary steps necessary to evolve an orderly and systematic conception of the subject.

Dr. Baylis and Mr. Daubney have rendered an invaluable service to the science of Helminthology. Our knowledge of the systematic side of the subject is not sufficiently advanced to make it possible to formulate an infallible scheme of classification, but with the materials available the writers have produced a very successful guide. The generic descriptions are succinct, clear and epitomatic. Each includes the general habitat of the parasite, the name of its typical species, and references to important papers on the genus. Frequently, also, a critical commentary is given on the authors' conception of its name, its systematic position, or on obscure details. All genera of Nematodes—free-living as well as those parasitic on plants or animals—are described, and in this way over 600 diagnoses are given and classified. In addition, exhaustive systematic and alphabetical indices are provided.

The value of this volume to the practising Veterinary Surgeon is problematical. Its value to the laboratory worker is certain, and it will, in the future, form an essential book of reference. It is unfortunate that it contains neither illustrations nor lists of species, but both would have added considerably, not only to the bulk, but to the cost. Species can be readily found by reference to the well-known Index Catalogue of Roundworms compiled by STILES and HASSALL in America, but satisfactory illustrations are not so readily obtainable. The writers have compromised on this point by appending references after each genus which will enable these to be searched for in periodicals and other works. On account of this compromise it has been possible to keep the price moderate, and the size convenient.

T. W. M. Cameron.

MÜLLER (Georg) [Professor and Director of the Clinic for Small Animals at the Veterinary High School at Dresden] & GLASS (Alexander) [A. M., V.S. (McGill), Professor of Canine Medicine in the Veterinary Department, University of Pennsylvania.] **Diseases of the Dog and their Treatment.** Fifth Illustrated Edition Revised and Enlarged.—pp. xvi+655. With 7 plates & 255 text figs. 1926. London: Baillière, Tindall & Cox. [Price 30s. net.]

The prefatory note to the fifth edition of this work in English claims that it is a practically new book, having been entirely revised from beginning to end. It is apparently a translation of the third German edition published in 1921 with additions by Dr. Glass, for which a similar claim was made. It will, therefore, be seen that there have been considerable changes since the fourth English edition published ten years ago. The result is a work of considerable excellence, and one likely to be of great assistance to veterinary surgeons and students. The text is, on the whole, of a very high order, and most of the views expressed coincide with the opinions now held in authoritative circles in this country. As an example of this may be quoted the chapter on Distemper. After briefly referring to various researches and expressed opinions as to etiology, the authors conclude with the statement that " the bulk of evidence tends to lean to the theory that the specific micro-organism, whatever it is, must be ultra-microscopical." The clinical features are described, almost identically with a recent English work on the subject, as developing in four forms, (1) Catarrhal distemper (eyes, nose and lungs), (2) gastric distemper (intestinal distemper), (3) nervous distemper, (4) exanthematical distemper. Thus the disease is systematically dealt with, and sound therapeutical measures are indicated for almost any complication.

There are, however, defects which are a little surprising. For example, there is no reference to the important rôle of vitamins in general development and nutrition, particularly in regard to the absence of the fat-soluble vitamins, and the production of rickets, and the onset of polyneuritis in the absence of water soluble B.

The descriptions of some of the operations are very lucid, while others are vague and difficult to follow. It is doubtful if any person reading the amounts of operations for scrotal hernia and inguinal hernia would feel competent to undertake either operation. It is misleading to note that luxation of the patella, excellently described otherwise, is seen only in small animals. The writer has met with it quite frequently in bulldogs, collies, and Alsatian wolfhounds.

There is a good chapter on diseases of the eyes. With regard to entropion, the authors state that HALTANHOFF considers that the tendency to it is hereditary, but they neither agree nor disagree with this view. The writer has considerable evidence to show that it is very frequently indeed hereditary, and follows certain strains regularly in the case of chow-chows, airedales and others.

The book is generously illustrated, but we regret that we cannot express the same compliments regarding their quality. Many of them are distinctly crude and very diagrammatic. For example, the figures illustrating different methods of amputation (p. 464) look more like sawing through bundles of firewood than through legs. The plate facing p. 454 shows a dog undoubtedly suffering from a deficiency of certain accessory food factors, but it is certainly not rickets, while the coloured plate facing p. 59 is both hideous and crude and in our opinion of no value whatever. We hope that in the next edition, and we feel certain that the general excellence of the work will merit one, some of these eyesores will be removed or replaced by something better.

The printing and binding are in the publishers' usual good style.

G. H. W.

LANDER (G. D.) [D.Sc., Formerly Professor of Chemistry and Toxicology, Roy. Vet. College, London.] **Veterinary Toxicology.** 2nd Edition.—pp. xiv+325. With 39 text figs. 1926. London: Baillière, Tindall & Cox, 8, Henrietta Street, Covent Garden. [Price 12s. 6d. net.]

It is, perhaps, even more important for the veterinarian than for the medical practitioner to possess a sound knowledge of poisons and of their action on the animal organism.

Since agriculturists have been provided with artificial fertilizers and manufactured foodstuffs the toxic actions of some of these have caused considerable economic damage. It is only necessary to recall the poisonous actions of sodium nitrate and of foods containing castor seed, mustard and cyanogenetic glucosides on stock to indicate the practical relation of veterinary toxicology to agriculture. Under modern conditions carbon monoxide appears to be the most frequent poison encountered in man, whilst the common fatal intoxications produced by lead compounds and poisonous plants in cattle have no counterpart in human medicine. It is therefore obvious that a good text-book on veterinary toxicology is essential for the veterinarian and Dr. Lander published his text-book fourteen years ago. The present edition includes a substantial proportion of the more recent additions to our knowledge, particularly in the domain of plant poisons. For the sake of completeness, a short section on the effects of mustard gas (and other poisonous gases used in the war) on horses might have been usefully included. This work should be in the hands of every English veterinary surgeon. The author's experience has led him

to write a practical work rather than a purely scientific treatise. Hypotheses and theories are ephemeral; the fashion of to-day is obsolete to-morrow. But the records of careful observations have a permanent character and are independent of theory.

The occurrence of each poison, the symptoms, *post-mortem* appearances and, where possible, chemical diagnosis and toxic doses are enumerated, the least satisfactory of these sections being necessarily that referring to fatal toxic doses. For example, Kaufmann's toxic dose of strychnine for a dog (one-twelfth to one-third grain) is undoubtedly much too high. The book is singularly free from typographical errors, the only one noticed by the reviewer being on page 118, where the author's meaning has been reversed by the printing of "*marked*" for "*masked.*" This is the only modern English work on veterinary toxicology and it can be recommended unreservedly to the student and the practitioner.

G. W. Clough.